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**Name of Author:** Terra C. Murray

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University of Alberta

Eating Attitudes and Behaviours of Competitive Athletes

by

Terra C. Murray



A thesis submitted to the Faculty of Graduate Studies and Research in partial fulfillment  
of the requirements for the degree of Masters of Science.

Faculty of Physical Education and Recreation

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## **ABSTRACT**

This study examined the eating attitudes and behaviours of male (N = 64) and female (N=101) Canadian Interuniversity Athletic Union athletes and male (N = 37) and female (N = 95) controls from the University of Alberta. Measures included height, weight, sum of five skinfolds, and the Eating Disorder Inventory (EDI), Dutch Eating Behaviour Questionnaire-Restrained eating (DEBQ-R), and Questionnaire for Eating Disorder Diagnosis (Q-EDD). Results showed that 3% of female athletes, 4.7% of male athletes, 12.6% of female controls, and no male controls met criteria for a clinical eating disorder. Female athletes exhibited more disordered eating attitudes and behaviours than male athletes. However, both male and female controls exhibited more disordered eating attitudes and behaviours than male and female athletes, although both groups fell within a normative range of eating patterns on the various questionnaires. Results suggest that generally, athletes may not be at risk for eating disorders.





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## TABLE OF CONTENTS

|  |    |
|--|----|
| CHAPTER I. INTRODUCTION.....             | 1  |
| Purpose.....                             | 3  |
| Significance of Study.....               | 4  |
| Delimitations.....                       | 5  |
| Limitations.....                         | 6  |
| Definitions.....                         | 7  |
| Eating Disorders.....                    | 7  |
| Disordered Eating.....                   | 9  |
| At Risk.....                             | 10 |
| CHAPTER II. REVIEW OF LITERATURE.....    | 11 |
| Sport as a Risk Factor.....              | 11 |
| Prevalence.....                          | 14 |
| Eating Attitudes and Behaviours.....     | 18 |
| Athletes in Lean Emphasized Sports.....  | 19 |
| Summary.....                             | 21 |
| CHAPTER III. METHODS AND PROCEDURES..... | 23 |
| Design.....                              | 23 |
| Participants.....                        | 23 |
| Procedures.....                          | 24 |
| Measures.....                            | 25 |
| General Survey.....                      | 25 |





|   |    |
|---|----|
| Eating Disorder Inventory.....                                      | 25 |
| Questionnaire for Eating Disorder Diagnosis.....                    | 26 |
| Dutch Eating Behaviour Questionnaire-Restraint.....                 | 27 |
| Anthropometric Measures.....  | 28 |
| Analyses of Data.....   | 28 |
| CHAPTER IV. RESULTS.....  | 30 |
| Participants.....   | 30 |
| Physical Data.....  | 33 |
| Females.....  | 33 |
| Males.....  | 33 |
| Athlete Training Data.....  | 33 |
| Eating Behaviour.....   | 36 |
| Hypothesis One.....   | 36 |
| Hypothesis Two.....   | 41 |
| CHAPTER V. DISCUSSION .....   | 46 |
| Physical Characteristics.....                                       | 47 |
| Athlete Training Data.....  | 48 |
| Eating Attitudes and Behaviours Among Male and Female Athletes..... | 49 |
| Summary.....  | 56 |
| Eating Attitudes and Behaviours Among Athletes and Controls.....    | 58 |
| Summary.....  | 63 |
| CHAPTER VI. CONCLUSIONS.....  | 65 |
| Summary and Conclusions.....  | 65 |



|  |    |
|--|----|
| Recommendations.....   | 69 |
| REFERENCES.....  | 71 |
| APPENDIX A: Consent Form.....                                      | 77 |
| APPENDIX B: Information Letter – Coaches.....                      | 78 |
| APPENDIX C: Information Letter – Athletes.....                     | 80 |
| APPENDIX D: Information Letter – Controls.....                     | 81 |
| APPENDIX E: General Survey – Athletes.....                         | 82 |
| APPENDIX F: General Survey – Controls.....                         | 84 |
| APPENDIX G: Eating Disorder Inventory.....                         | 85 |
| APPENDIX H: Questionnaire for Eating Disorder Diagnosis.....       | 91 |
| APPENDIX I: Dutch Eating Behaviour Questionnaire – Restraint ..... | 95 |





## LIST OF TABLES

|   |    |
|---|----|
| Table 1: <i>DSM-IV</i> (1994) Criteria for Anorexia Nervosa and Bulimia Nervosa ...           | 8  |
| Table 2: Physical Data (Females).....   | 31 |
| Table 3: Physical Data (Males) .....  | 32 |
| Table 4: Training Data (Female Athletes).....   | 34 |
| Table 5: Training Data (Male Athletes).....   | 35 |
| Table 6: Mean and Standard Deviations of EDI subscales for athletes and<br>controls.....      | 37 |
| Table 7: DEBQ-R Mean and Standard Deviations for athletes.....                                | 38 |
| Table 8: Prevalence of Problematic Eating/Weight Restricting Behaviours<br>(Q-EDD).....       | 39 |
| Table 9: Q-EDD Classification of eating disorders among male and female<br>athletes.....      | 40 |
| Table 10: DEBQ-R (Mean and Standard Deviations) .....   | 43 |
| Table 11: Q-EDD Classification of eating disorders among female athletes and<br>Controls..... | 44 |



## I. INTRODUCTION

Recent research seems to indicate that athletes, especially female athletes, are at increased risk for eating disorders (Hausenblas & Carron, 1999; Sundgot-Borgen, 1994b). Given the extreme pressure to win and succeed that athletes may feel, it is not surprising that many athletes engage in unhealthy behaviours related to dieting (Thompson & Sherman, 1999). Many athletes experiment with their diets, hoping to find something that gives them the competitive edge (Koszewski, Chopak, & Buxton, 1997). While females in North America are exposed to sociocultural pressures to be thin, some athletes experience additional sport cultural pressures, especially in sports that emphasize thinness (Sundgot-Borgen, 1994a). Psychosocial pressures, coupled with demands from competitive sports have led some researchers to hypothesize that athletes may be “at risk” for the development of an eating disorder (Williamson et al., 1995).

Although clinically diagnosed eating disorders are quite rare, disordered eating tendencies in general are much more common. Eating behaviours can be thought of as existing on a continuum, ranging from relatively healthy eating patterns to frank eating disorders (Harris & Nattiv, 1995). Disordered eating refers to a variety of dysfunctional eating practices (i.e., behaviours) along this continuum, such as fasting and diet pill use (Harris & Nattiv). While there are negative health consequences associated with many dysfunctional eating behaviours, it is also believed that such behaviours may lead to clinical eating disorders, such as anorexia and bulimia nervosa (Garner, Garfinkel, Rockert & Olmsted, 1987), which are also associated with serious medical complications. Anorexia nervosa is associated with hormonal imbalances, gastrointestinal, cardiovascular (e.g., bradycardia) and metabolic complications (Goldbloom & Kennedy,





1995). Bulimia nervosa is associated with fluid and electrolyte changes, cardiac arrhythmia, and can result in gastrointestinal problems and erosion of tooth enamel (Mitchell, 1995). Mortality rates due to medical complications in anorexia and bulimia nervosa are among the highest of those found in psychiatric disorders, around 18% (Mitchell, 1995; Ratnasuriya, Eilser, Szmuckler, & Russell, 1991). Eating disorders also have been associated with feelings of low self-esteem, poor body image, stress, anxiety and depression (Fisher et al., 1995).

O'Connor and Smith (1999) report that “no scientifically compelling study of eating disorders in female athletes has yet been conducted” (p.1011). There have been two large scale studies examining the prevalence of eating disorders and disordered eating behaviour in athletes, one in the United States (Johnson, Powers & Dick, 1999) and the other in Norway (Sundgot-Borgen, 1994b). Both studies demonstrated that disordered eating behaviours are relatively common in athletes, although clinically diagnosable eating disorders are less common. For example, between 10% and 38% of male and female varsity (NCAA) athletes in the United States (Johnson et al.) and over 22% of national team female athletes in Norway (Sundgot-Borgen) reported engaging in some form of disordered eating behaviour(s). However, only 1.1% of NCAA athletes met criteria for an eating disorder (bulimia nervosa), while in Norway 1.3% of female athletes met criteria for anorexia nervosa and 8.0% met criteria for bulimia nervosa.

Past research examining eating disorders and disordered eating in athletes indicates that disordered eating tendencies are more common in female than male athletes (Sundgot-Borgen, 1994b). However, there have been relatively few studies examining the prevalence of eating disorders and/or disordered eating in male athletes. Moreover, most



studies have only focussed on one or two sport domains, such as rowing or wrestling. Recent research has demonstrated that male athletes also engage in disordered eating behaviours (Johnson et al., 1999; Thiel, Gottfried & Hesse, 1993), and thus may be at risk for eating disorders.

### **Purpose**

There is no Canadian study examining the prevalence of clinical eating disorders in male and female Canadian Interuniversity Athletic Union (CIAU) athletes. In addition, few Canadian studies have been conducted examining eating attitudes and behaviours of CIAU varsity athletes. Further, there is little consensus in the literature as to whether athletes are at increased risk for eating disorders. Therefore, the purpose of the present study was to examine the prevalence of eating disorders in male and female CIAU athletes at the University of Alberta. The eating attitudes and behaviours, including restrained eating, in male and female CIAU athletes, as well as a control group of undergraduate non-athletes at the University of Alberta were examined.

Specifically, two hypotheses were formed. First, it was hypothesized that the prevalence rates of clinical eating disorders would be higher in female athletes than male athletes. In addition, female athletes would exhibit more disordered eating attitudes and behaviours, including restrained eating, compared to male athletes. Second, it was hypothesized that the prevalence rates would be higher in female and male athletes compared to their respective genders control group. Additionally, male and female athletes would exhibit more disordered eating attitudes and behaviours, including restrained eating, compared to controls.



## Significance of Study

Many studies examining the relationship between athletes and eating disorders and/or disordered eating have been plagued with methodological issues. Firstly, most studies only partially operationalize eating disorders according to the *Diagnostic and Statistical Manual for Mental Disorders-fourth edition (DSM-IV*; American Psychiatric Association, 1994) criteria or use outdated criteria, making generalizability across studies difficult, as each study therefore 'defines' an eating disorder differently. For this reason, Hausenblas and Carron (1999) encourage researchers to use the Questionnaire for Eating Disorder Diagnosis (Q-EDD; Mintz, O'Halloran, Mulholland, & Schneider, 1997) which operationalizes eating disorders according to current *DSM-IV* criteria. Secondly, most studies only examine athletes from one or two sport domains (e.g., gymnastics, figure skating), making it difficult to compare across sport domains and arrive at some consensus about athletes in general. Thirdly, most studies have ignored male athletes, or only examined male athletes in a specific sport domain (i.e., rowing). Although eating disorders and disordered eating tendencies are apparently not as common in males, there is evidence to suggest that male athletes are also at risk for eating disorders (ACSM, 1997; Johnson et al., 1999; Thiel et al., 1993).

Disordered eating often leads to inadequate nutrient intake, and deprives the body of carbohydrates needed for metabolic function, maintenance of homeostasis and energy needed to perform activity (Koszewski et al., 1997). Decreased energy intake during intense training may lead to impaired performance, fatigue, menstrual dysfunction (Harber, 2000), as well as decreased strength, endurance, reaction time, and ability to concentrate (West, 1998). Purging behaviours and food restriction can result in menstrual





dysfunction, bone loss, and other serious medical and psychological complications, some of which are irreversible and fatal. The American College of Sports Medicine (ACSM, 1997) has issued a position stand stating that the female athlete triad “is a serious syndrome consisting of disordered eating, amenorrhea and osteoporosis” (p. i). The female athlete triad may be related to pressure placed on young women to achieve and maintain an unrealistically low body weight (ACSM, 1997). Women involved in sports where low body weight is emphasized for athletic or appearance purposes may be at greatest risk. The female athlete triad can also occur in girls and women who are physically active, but not training or competing in specific sports. As stated above, male athletes are also at risk for disordered eating, especially those in weight related and endurance sports (ACSM, 1997). Anorexia nervosa and extensive physical activity in men has been related to osteoporosis and hypogonadism (ACSM, 1997).

Therefore, this study offered significant contributions to the field of research examining eating attitudes and behaviours in athletes. First, it offered some comparative Canadian data, thereby giving researchers a representation of the extent of the problem in a sample of Canadian athletes. Second, it examined male athletes, who have been frequently disregarded in past research. Third, a variety of sport domains were examined with both male and female athletes, not merely sports with strong aesthetic components or weight restrictions. Fourth, it employed a control group of undergraduate students from the University of Alberta, which allowed for comparison to the athlete population.

### **Delimitations**

This study investigated eating attitudes and behaviours, including restrained eating, of athletes at the University of Alberta competing in 16 varsity CIAU sports:



men's and women's soccer, volleyball, basketball, wrestling, ice hockey, cross country, track and field, and women's field hockey and rugby. As mentioned previously, male athletes have been relatively ignored in the literature, although there is some evidence to suggest that they also exhibit disordered eating attitudes and behaviours (Thiel et al., 1993). Also, a variety of CIAU sport domains were examined, as opposed to only one sport domain, allowing for a more representative view of athletes in general.

Second, as mentioned previously, there have been shortcomings of previous research in the operationalization of eating disorders in athletes. Therefore, this study used the Questionnaire for Eating Disorder Diagnosis (Q-EDD; Mintz, O'Halloran, Mulholland, & Schneider, 1997), which operationalizes eating disorders according to current *DSM-IV* criterion. The Q-EDD also differentiates between anorexia and bulimia nervosa, as well as between individuals who have symptoms of eating disorders, but do not meet criteria for a clinical eating disorder. The Eating Disorder Inventory (EDI; Garner, 1991) and Restrained Eating Scale from the Dutch Eating Behaviour Questionnaire (DEBQ-R; Van Strien, Frijters, Bergers, & Defares, 1986) were used to assess eating disordered attitudes and behaviours, and restrained eating. This allowed for comparisons with previous studies that have predominantly used these measures, especially the EDI.

### **Limitations**

First, only self-report measures were in this study. Self-report measures can be vulnerable to distortion of response style bias, imprecise reporting, and denial. For example, Sundgot-Borgen, (1994a) reported that athletes tend to under-report



dysfunctional eating behaviours with self-report instruments, when compared to interview responses.

Second, this study examined only CIAU athletes and controls that volunteered to participate in the study from the University of Alberta. Many of the sports included in this study have not been typically associated with an increased risk for eating disorders, and thus the prevalence of disordered eating attitudes and behaviours might be lower than expected if a more “at risk” population was measured. It may be possible those individuals who have potential problematic eating attitudes and behaviours chose not to participate in the study, potentially biasing the results. In addition, because this study only examined individuals from the University of Alberta, attempts to generalize to other individuals across other universities are limited.

## **Definitions**

### **Eating Disorders**

According to the American Psychiatric Association (APA; 1994) eating disorders (i.e., anorexia nervosa and bulimia nervosa) are characterized by severe disturbances in eating behaviour resulting in serious psychological, physiological and social consequences. Anorexia nervosa is characterized by a refusal to maintain a minimally normal body weight. Bulimia nervosa is characterized by repeated episodes of binge eating, followed by inappropriate compensatory methods, like excessive exercise, for example (APA, 1994). The diagnostic criteria for anorexia and bulimia nervosa are outlined in Table 1.





**Table 1. *DSM-IV* (1994) criteria for Anorexia Nervosa and Bulimia Nervosa**

|  |
|--|
| <p>Anorexia Nervosa</p> <ul style="list-style-type: none"><li>A. Refusal to maintain body weight at or above a minimally normal weight for age and height (i.e., at or below the 85<sup>th</sup> percentile)</li><li>B. Intense fear of gaining weight or becoming fat, even though underweight.</li><li>C. Disturbance in the way in which one's body weight or shape is experienced, undue influence of body weight or shape on self-evaluation, or denial of the seriousness of the current low body weight.</li><li>D. In postmenarcheal females, amenorrhea, i.e., the absence of at least three consecutive menstrual cycles.</li></ul>  |
| <p>Bulimia Nervosa</p> <ul style="list-style-type: none"><li>A. Recurrent episodes of binge eating. An episode of binge eating is characterized by both of the following:<ul style="list-style-type: none"><li>(1) Eating, in a discrete period of time (e.g., within any 2-hour period), an amount of food that is definitely larger than most people would eat during a similar period of time and under similar circumstances</li><li>(2) A sense of lack of control over eating during the episode (e.g., a feeling that one cannot stop eating or control what and how much one is eating)</li></ul></li><li>B. Recurrent inappropriate compensatory behaviour in order to prevent weight gain, such as self-induced vomiting; misuse of laxatives, diuretics, enemas, or other medications; fasting; or excessive exercise.</li><li>C. The binge eating and inappropriate compensatory behaviours both occur, on average, at least twice a week for three months.</li><li>D. Self evaluation is unduly influenced by body shape and weight.</li><li>E. The disturbance does not occur exclusively during episodes of Anorexia Nervosa.</li></ul> |

*Note.* From the American Psychiatric Association (1994) *Diagnostic and Statistical Manual of Mental Disorders* (4<sup>th</sup> ed., pp. 544-550).

Along with these diagnostic criteria, the *DSM-IV* also recognizes two subtypes of anorexia nervosa and bulimia nervosa. In anorexia nervosa there are restricting and binge eating/purging subtypes. The binge eating/purging type is associated with episodes of binge eating and purgatory behaviours (i.e., self-induced vomiting, misuse of laxative, diuretics or enemas). The restricting type does not engage in any of the aforementioned behaviours associated with the binge/purge type (APA, 1994). In bulimia nervosa, purging and nonpurging subtypes are recognized. The purging subtype regularly engages in self-induced vomiting, or the misuse of enemas, laxatives or diuretics. The nonpurging type uses other forms of compensatory behaviours, such as excessive exercise, but does not regularly engage in the purging behaviours mentioned above (APA, 1994). Although



some of the criteria are similar between anorexia and bulimia, individuals with bulimia are typically of average weight and do not normally experience amenorrhea.

The *DSM-IV* also characterizes a third type of eating disorder, eating disorder not otherwise specified (EDNOS). The EDNOS diagnosis is given for “disorders of eating that do not meet the criteria for any specific Eating Disorder” (APA, 1994, p. 550). For example, women who meet all criteria of AN, but who are either not experiencing amenorrhea, or who are of normal weight would be classified as EDNOS. Many of the eating disorders falling into this category are referred to as atypical, subclinical or subthreshold forms of anorexia and bulimia (Mintz et al., 1997).

### **Disordered Eating**

Disordered eating refers to the full spectrum of dysfunctional eating behaviours. At one end of the continuum lies “normal” eating behaviour, followed by poor nutrition and dieting behaviours, then occasional binge and purge behaviours, and at the other end of the continuum lie severe and frank eating disorders, such as anorexia and bulimia nervosa (Harris & Nattiv, 1995; West, 1998). While eating disorders per se are quite rare, disordered eating behaviours are more common. Disordered eating may be characterized by behaviours such as chronic dieting (repeated weight loss and weight gain), diet pill use, fasting, occasional binge/purge behaviours, and dietary restriction (e.g., skipping meals and/or eating smaller meals) (Koszewski et al., 1997). There may also be expressed dissatisfaction with one’s body image.

Disordered eating can be distinguished from clinically diagnosed eating disorders by the irregularity of dysfunctional eating behaviours, and the absence of certain psychological features (e.g., fear of becoming fat, feeling that one is no longer in



control). Also, individuals displaying disordered eating behaviours are not pathologically preoccupied with food and body weight, and likely do not feel guilt, shame or embarrassment about their eating behaviours (Koszewski et al., 1997). However, disordered eating behaviour is of concern as it is believed that the disordered tendencies may lead to clinically diagnosable eating disorders (Garner et al., 1987).

### **“At Risk”**

The term “at risk” often appears in the eating disorder literature. Researchers have proposed a number of risk factors thought to be associated with eating disorders. Some potential risk factors may be social pressure for thinness, teasing about appearance, poor self-esteem, stress, and negative evaluation of achievement (Williamson et al., 1995). With regard to athletics, potential risk factors also may include athletic performance anxiety and negative self-appraisal of athletic achievement (Williamson et al.). Many researchers use standardized questionnaires, such as the Eating Disorder Inventory (EDI; Garner Olmsted & Polivy, 1993; Garner 1991), an instrument designed to assess eating attitudes and behaviours (i.e., symptomatology) commonly associated with eating disorders. An elevated score on the EDI (e.g., Garner, 1991) may suggest that an individual engages in disordered eating practices, and thus are often considered to be “at risk” for an eating disorder (e.g., Sundgot-Borgen, 1994b).



## **II. REVIEW OF LITERATURE**

A number of researchers report that compared to the general population, athletes are “at risk” (Sundgot-Borgen, 1994b) for eating disorders and a recent meta-analysis (Hausenblas & Carron, 1999) appears to support this supposition. Prior to a review of the literature examining the eating attitudes and behaviours of athletes, a brief examination of why athletes are considered to be “at risk” for eating disorders will be conducted.

### **Sport as a Risk Factor**

One possible risk factor for an eating disorder is thought to be participation in sport (Burckes-Miller & Black, 1991; Garner & Rosen, 1991; Sundgot-Borgen, 1994b). It has been hypothesized that athletes may be “at risk” because of the sport environment itself (e.g., wrestling, gymnastics), the potential role of excessive exercise or physical activity, and sociocultural norms of thinness within Western society.

Results of previous studies suggest that athletes involved in certain sports, such as those with strong aesthetic components (e.g., figure skating, gymnastics) or weight restrictions (e.g., wrestling), may create a sport environment where there is extra emphasis on body shape and/or weight (e.g., Petrie, 1993; Theil et al., 1993). For example, Theil et al. found that male wrestlers and rowers engage in more pathogenic weight control behaviours, and have higher rates of eating disorders than males in the general population. The authors speculate that this may be because in both rowing and wrestling, athletes are required to maintain a specific weight in order to compete. Thus, the actual requirements of the sport may be placing some athletes (e.g., wrestlers) at risk for eating disorders. In gymnastics both thinness and appearance are emphasized, which may increase the occurrence of pathogenic weight control behaviours and disordered





eating tendencies (Petrie, 1993), as athletes try to meet the aesthetic standard of the sport. Pressures within the sport environment may also come from coaches and teammates, who may encourage unhealthy weight management practices (Sundgot-Borgen, 1994a). Recently, Berry and Howe (2000) found that social pressures from teammates and coaches may act as a potential risk factor for disordered eating in female varsity athletes.

A number of researchers have focused on the hypothesized relationship between physical activity and eating disorders (especially anorexia), where involvement in excessive exercise may play a role in the development of eating disorders (Davis 1999; Davis, Kennedy, Ravelski, & Dionne, 1994). “Activity anorexia” was pioneered by Epling, Pierce & Stefan (1983). Results from their studies showed that animals will increase their exercise time during periods of caloric deprivation, and eventually the animals stop eating completely (Epling et al., 1983). Thus, they believe that the combination of dietary restriction and excessive exercise can lead to eating disorders, namely anorexia (Epling & Pierce, 1991). The recent research by Davis suggests that individuals with anorexia nervosa often engage in abnormally high levels of physical activity, especially during periods of extreme caloric deprivation. Also, Davis et al. found in a sample of women with anorexia nervosa that over 60% reported that they were competitive athletes prior to the onset of their disorder. Similarly, Sundgot-Borgen (1994b) found some elite endurance athletes could not give any reason as to why they developed eating disorders. Specifically, these athletes were subjected to a sudden increase in training volume and subsequently lost large amounts of weight and developed severe eating problems, including anorexia nervosa.



Many researchers believe that the societal norms for women in Western culture that require thin, yet fit physiques play a role in eating disorders (Striegel-Moore, 1995). This thin ideal is thought to place pressure on individuals (especially females) to conform to such standards. Individuals may attempt to achieve the thin ideal through a variety of behaviours, such as chronic dieting and excessive exercise. The subculture of certain sports, such as gymnastics, may intensify the societal standards of thinness (Wilfley & Rodin, 1995). Additionally, female athletes in general exist as part of the larger society, and are thus also thought to be vulnerable to such societal pressures (Thompson & Sherman, 1999). Research has shown that female athletes exhibit more disordered eating attitudes and behaviours than male athletes (Johnson et al., 1999; Sykora, Grilo, Wilfley & Brownell, 1993). Berry and Howe (2000) found that restrained eating behaviours in athletes could be predicted by body image, concluding that body image and social factors (e.g., the thin ideal), may be risk factors for disordered eating attitudes and behaviours in athletes.

There are several ways in which researchers attempt to examine whether or not athletes are in fact “at risk” for eating disorders. One way is to examine prevalence rates of eating disorders in athletes, and compare the rates of eating disorders in athletes to rates found in the general population, or to a control group of non-athletes. If prevalence rates in athletes are higher than non-athlete groups or the general population, athletes may be considered to be at risk for eating disorders. Researchers also often compare athletes to control groups or previously published norms of measures of eating attitudes and behaviours (e.g., the EDI). If athletes score higher on these measures than controls or previously published normative data, then they may be thought to be at risk for eating



disorders. Researchers may also examine subgroups of athletes, such as gymnasts or wrestlers, who are thought to be increased risk for eating disorders because of their sport environment, or restrictions. Athletes within these groups are often described as belonging to “lean-emphasized” sport domains. Researchers may then compare lean-emphasized athletes to other groups of athletes (whose sport does not emphasize leanness) or to control groups of non-athletes, to help determine if athletes in lean emphasized sports are indeed at greater risk for eating disorders.

### **Prevalence**

The *DSM-IV* reports prevalence rates to be between .5%-1% for anorexia nervosa and 1%-3% for bulimia nervosa, in females during late adolescence and early adulthood (APA, 1994). Prevalence rates for males are not reported, but the rate of occurrence is thought to be one tenth of that of females (APA). Individuals who do not meet full *DSM-IV* criteria, but still experience disordered eating attitudes and behaviours are more common, although exact prevalence rates fluctuate, depending on how eating disorders are defined and conceptualized within the studies.

There have been relatively few studies of athletic populations focusing on the prevalence of eating disorders and results are equivocal. Burckes-Miller & Black (1988) found that in total 3% of male and female college athletes met criteria for anorexia nervosa, and 21.5% met criteria for bulimia nervosa. Sungot-Borgen (1994b) reports that of 522 elite (i.e., members of national sport teams) female athletes, 103 were deemed to be “at risk” for an eating disorder. Subsequent interviews determined that 1.3% (of the original 522 participants) met criteria for anorexia nervosa and 8.0% met criteria for bulimia nervosa. More recently, Johnson et al. (1999) found much lower prevalence rates





of eating disorders in male and female NCAA athletes. Specifically, prevalence rates for bulimia nervosa were approximately 1.1% and for anorexia nervosa, 0% in females. None of the male athletes met criteria for either anorexia or bulimia nervosa (Johnson et al.).

Estimates in prevalence rates may differ due to the method of data collection. That is, the prevalence rates reported by Johnson et al. (1999) were obtained from self-report data, and were derived from EDI subscale scores and reporting of specific pathogenic weight control behaviours. However, rates reported by Sungot-Borgen (1994b) were determined from interviews. Generally, interviews are considered to be superior, as disordered eating behaviours are frequently denied by athletes on standard self report questionnaires (ACSM, 1997; Sungot-Borgen, 1994a). That being said, it is also possible that prevalence rates reported by Sundgot-Borgen are conservative, as athletes who were not considered to be at risk were not interviewed. It is possible that some of those athletes did have clinically diagnosable eating disorders, but did not report disordered eating attitudes and behaviours on the standardized questionnaire initially completed.

Hausenblas and Carron (1999) suggest that researchers use the Questionnaire for Eating Disorder Diagnosis (Q-EDD; Mintz et al., 1997) to operationalize eating disorders to current *DSM-IV* criteria in order to provide some consistency on how eating disorders are being measured in studies. The Q-EDD was developed to help overcome problems that may be associated with previous research examining prevalence rates of eating disorders, such as a lack of generalizability across studies (Mintz et al., 1997). The Q-EDD operationalizes eating disorder criteria of the *DSM-IV*, and differentiates between



individuals with and without an eating disorder diagnosis, among individuals with an eating disorder, and symptomatic individuals, and also between anorexia and bulimia diagnoses (Mintz et al.). The first study examining reliability and validity testing of the Q-EDD involved 1400 college women (Mintz et al.). All respondents (N = 33) who scored within an eating disorder category and a random sample of non-eating disordered participants (N = 103) were subsequently interviewed and completed a variety of other questionnaires (Mintz et al.). A second study was conducted further examining the reliability, validity and inter-scorer agreement of the Q-EDD. Testing was done with a different sample (N = 167) of college women, and followed the same basic procedure of the first study. A third study was conducted that assessed the criterion validity of the Q-EDD to a clinical sample of women with eating disorders (Mintz et al.). In all three studies the Q-EDD demonstrated reliability, (test retest kappa = .85-.94) and convergent validity (when compared to other standardized instruments, e.g., the EDI), as well as incremental validity (accuracy rate between .94-.97, false negative rate .22, false positive rate .02-.05, sensitivity .78 and specificity .95) (Mintz et al.). The Q-EDD is a relatively new instrument and has not been used in an athlete population before. Previous research with the Q-EDD has used the measure to determine prevalence rates of eating disorders in college women (e.g., Mulholland & Mintz, 2001; Smart, 1999; Southerland, 2000) and in preliminary diagnoses of an eating disorder in an adolescent woman (O'Halloran, 1999).

The prevalence rates of eating disorders reported in the literature are based on *DSM-IV* criteria (presented in Table 1), and as stated above, relatively few studies examine such clinically defined eating disorders. Research on disordered eating, which



refers to the full subclinical spectrum of dysfunctional eating patterns (Yeager, Agostini, Nattiv & Drinkwater, 1993) suggests that disordered eating behaviours may be a significant problem for athletes (Thompson & Sherman, 1999).

Research examining disordered eating behaviours (or pathogenic weight control methods) suggests that the use of pathogenic behaviours is a problem in athletes, although the frequency of such behaviours varies from study to study. For example, some research has found that 14% of female athletes have vomited to prevent weight gain, 16% abuse laxatives, and 25% misuse diet pills (Rosen, McKeag, Hough, & Curley, 1986). Theil et al. (1993) found that 52% of male wrestlers and rowers engaged in binge eating. Black and Burckes-Miller (1988) found that 23.5% of male and female athletes use strict dieting behaviours (ie., less than 600 calories per day), 11.9% fast for 24 hours, and 5.6% engage in self-induced vomiting. More recently, Johnson et al. (1999) found that 22% of female athletes and 11% of male athletes engage in binge eating, over 6% of females and 2% of males vomit to prevent weight gain, and just over 1% of male and female athletes abuse laxatives. Many of the rates found in the Johnson et al. study are lower than those previously reported, which may suggest that athletes are engaging in pathogenic behaviours less frequently, or they are simply not reporting them. While pathogenic weight control behaviours can have serious health consequences, eating disorders are marked by severe disturbances in psychopathology, not just patterns of disordered eating behaviour (Dale & Landers, 1999). Thus, researchers should go beyond identifying and reporting only pathogenic behaviours, but also examine the psychological characteristics of the athletes.



## **Eating Attitudes and Behaviours**

Research examining eating attitudes and behaviours in athletes often suggest that athletes are “at risk” for eating disorders. However, results of studies may vary as a function of classification criteria used, and population studied. For example, Johnson et al. (1999) found that up to 10% of NCAA female athletes and 13% of male athletes exhibited disordered eating attitudes and behaviours (e.g., binge eating, purgatory behaviours, restrained eating and elevated scores on 3 subscales of the EDI). However, Petrie (1993) found that over 60% of NCAA female gymnasts were exhibiting disordered eating attitudes and behaviours, based on questionnaire (i.e., BULIT-R) responses. Sungot-Borgen (1994b) found that approximately 22% of elite female athletes in Norway exhibited disordered eating attitudes and behaviours (evidenced by elevated scores on the EDI), and were therefore considered “at risk” for the development of an eating disorder.

The above findings have lead many researchers to conclude that as a group, athletes are at risk for eating disorders. However, there is research to suggest that athletes are not at any greater risk for eating disorders than their non-athlete counterparts. For example, Hausenblas and Mack (1999) found no differences on the EDI between female athletes (i.e., diving, soccer, lacrosse, and volleyball) and female controls. Warren, Stanton and Blessing (1990) found that with the exception of gymnasts, female athletes did not differ from a control group on measures of eating attitudes and behaviours. In addition, although there was a difference found for gymnasts, all athletes and controls fell within a normative range on eating attitudes and behaviour measures (Warren et al.). Marshall and Harber (1996) found that with the exception of the Body Dissatisfaction





subscale, EDI scores were not elevated in university female field hockey athletes, which may suggest that the athletes were not at risk for eating disorders.

As stated previously, little research examines both male and female athletes from a variety of sport domains. However, research that has included both male and female athletes from a variety of sport domains has found that when compared to controls, athletes do not appear to be at risk for eating disorders. Wilkins et al. (1991) found that male and female controls scored higher than male and female athletes on indices of eating disorders. Similarly, Petrie (1996) found that male and female controls were more dissatisfied with their bodies than athletes, and felt less worthwhile (measured by the EDI) and effective than their respective genders athlete group (excludes athletes in lean emphasized sport group).

Therefore, while there is evidence to suggest that athletes may be at risk for eating disorders as evidenced by their score(s) on questionnaires assessing eating attitudes and behaviours, clearly the results are equivocal. However, in a recent meta-analysis of the literature, Hausenblas and Carron (1999) suggest that in general, female and male athletes report more anorexic and bulimic symptomatology (e.g., binge/purge behaviours, restrained eating) than non-athletes, which may make athletes at risk for eating disorders.

### **Athletes in Lean-Emphasized Sports**

Although disordered eating may be seen in athletes of all sports, it is a widely held view that some sports put certain athletes at a higher risk for eating disorders (ACSM, 1997; Sundgot-Borgen, 1994a; Thiel et al., 1993; West, 1998). The ACSM outlines the following sport characteristics that may put athletes at risk: (1) sports where athletic performance is subjectively judged (e.g., figure skating, diving, gymnastics,



dance), (2) endurance sports where low body weight is emphasized (e.g., distance running, cycling, cross-country skiing), (3) sports requiring tight/revealing clothing for competition (e.g., volleyball, swimming, track), (4) sports using weight criterion categories (wrestling, rowing, jockeys, martial arts) and (5) sports that emphasize a prepubertal body for success (e.g., gymnastics, diving, figure skating).

Therefore, researchers have been examining the possibility that certain subgroups of athletes may be more vulnerable to eating disorders than other athletes. Once again, there have been relatively few studies comparing subgroups of athletes. However, there is some evidence to suggest that athletes involved in sports that emphasize leanness or that have weight criteria may exhibit a higher degree of disordered eating attitudes and behaviours (Sundgot-Borgen, 1994a; Sundgot-Borgen & Corbin, 1989; Thiel, Gottfried & Hesse, 1993), and thus may be at increased risk for eating disorders. Research has shown higher EDI scores (indicating disordered eating attitudes and behaviours) in female athletes involved in sports which emphasize leanness, (Sundgot-Borgen & Corbin), with high aesthetic components (e.g., figure skating, diving, dance, gymnastics) and with weight dependent criteria (e.g., judo, karate, wrestling) compared to other female athletes (Sundgot-Borgen, 1994b). Petrie (1996) found that female athletes in lean emphasized sports (i.e., diving, cross-country and gymnastics) were more preoccupied with their weight than athletes in “non-lean” sports, and controls. Male rowers and wrestlers have been found to engage in more disordered eating practices compared to normative data (Thiel et al.).

In contrast to the above studies, O’Connor, Lewis and Kirchner (1995) found no differences between female college gymnasts and female controls on the EDI, although



both groups scored higher than normative data on the Drive for Thinness subscale. Similarly, Hausenblas and Mack (1999) found no differences between a group of female divers and a female athletic control group on the EDI. Moreover, Dale and Landers (1999) found no significant differences between the number of in-season wrestlers (36%) and non-wrestlers (29%) who were classified as “at risk” for an eating disorder.

Thus, while some research supports the assumption that athletes in “lean emphasized” sports exhibit more disordered eating attitudes and behaviours than other groups of athletes, findings are inconsistent. However, once again a recent meta-analysis (Hausenblas & Carron, 1999) supports the notion that athletes involved in sports with a strong aesthetic component or weight dependent criterion report more disordered eating tendencies than athletes in other sport domains.

### **Summary**

In summary, it is not clear that the actual prevalence of anorexia or bulimia nervosa is higher in athletes than non-athletes or the general population. Additionally, while it appears that some athletes exhibit a high degree of disordered eating attitudes and behaviours, findings are equivocal. Athletes involved in sports that emphasize leanness, or have a weight dependent criterion, may engage in more disordered eating behaviours than athletes in other sport domains.

Therefore, this study sought to examine two basic questions. One, are there differences between male and female athletes on measures of eating attitudes and behaviours, including restrained eating, and on prevalence rates of eating disorders? Two, are there differences between female athletes and female controls, and male athletes and male controls, on measures of eating attitudes and behaviours, and on prevalence rates of





eating disorders? Based on previous research and a recent meta-analysis, it was hypothesized that female athletes would exhibit more disordered eating attitudes and behaviour compared to male athletes, and that athletes would exhibit more disordered eating attitudes and behaviours compared to gender matched controls.



### **III. METHODS AND PROCEDURES**

#### **Design**

This investigation was a cross sectional study that examined the prevalence of eating disorders and the eating attitudes and behaviours of male and female varsity athletes ( $N = 165$ ) and an undergraduate control group ( $N = 132$ ), both from the University of Alberta. Ethics approval was obtained from the Faculty of Physical Education and Recreation Ethics Committee at the University of Alberta prior to collection of the data. All participants were familiarized with the study prior to their participation, and informed consent (Appendix A) was obtained for each participant.

There were not any immediate medical risks to participants in the study. However, the disclosure of personal information may have made some individuals feel uncomfortable. Participants were free to withdraw from the study at any time without consequence or penalty. No participants withdrew from the study, or asked for their results to be withdrawn from the study at any time. If participants chose, their individual results were mailed to them.

#### **Participants**

All athletes competing in selected CIAU sports (men's and women's soccer, volleyball, basketball, ice hockey, wrestling, cross country, track and field, and women's field hockey and rugby) attending the University of Alberta were invited to participate in the study. Coaches of each of the respective teams were briefed on the study, and agreed to allow their athletes the opportunity to participate in the study.

The control group was comprised of male and female undergraduate students from the University of Alberta, who volunteered to participate in the study. Participants



within the control group could not be involved in any competitive sport, and were asked not to be involved in vigorous physical activity for more than 30 minutes (per bout) four times per week. Vigorous physical activity was defined as activity that requires one to work up a good sweat (about 75% of their maximum heart rate), such as running, intense cycling etc. This was done to help ensure that controls were not as physically active as the athletes were, in order to help eliminate any possible confound of physical activity between the two groups.

### **Procedures**

Coaches of each CIAU team at the University of Alberta were initially sent an information letter (Appendix B) briefing them about the study. Coaches were then contacted to obtain permission for their team to participate in the study. After permission from each respective coach was obtained, athletes were briefed about the study, usually before or after a team practice, and volunteers for the study were sought.

During the Winter academic term (January 2001– March 2001), students attending undergraduate classes at the University of Alberta were informed about the study, and volunteers for the study were recruited. The students primarily came from first and second year health related courses, such as Health Education, Introductory Psychology, and Nutrition. These classes were selected on the basis of convenience and permission.

Both the athlete and control group were asked to come at predetermined times to a classroom setting where they received a detailed information letter about the study (Appendices C and D, respectively) and completed all measures. Anthropometric measures were taken by trained individuals at the time that questionnaires were given.



Each participant was called individually into a separate room to have their anthropometric measures taken, which resulted in a brief interruption of their questionnaire completion. Questionnaires were presented in random order to help decrease the likelihood of response bias.

### **Measures**

Measures in this study included a general survey, three standardized questionnaires assessing eating attitudes and behaviours, and anthropometric measures. Eating attitudes and behaviours were assessed by the Eating Disorder Inventory (Garner et al., 1983). Restrained eating was assessed by the Dutch Eating Behaviour Questionnaire-Restraint Scale (van Strien et al., 1986). The presence of eating disorders and pathogenic weight control behaviours was assessed by the Questionnaire for Eating Disorder Diagnosis (Mintz et al., 1998). Height, weight, and sum of five skinfolds were also taken.

#### **General Survey**

A general survey was developed to assess training patterns and sport history of the athletes, and included questions on demographic information (e.g., age, school status) for both athletes and controls. The general survey for the athletes and controls can be found in Appendices E and F, respectively.

#### **Eating Disorder Inventory (EDI)**

Eating attitudes and behaviours were assessed by the Eating Disorder Inventory (Appendix G) (EDI; Garner et al., 1983). The EDI is a 64 item, self report questionnaire, designed to assess psychological and behavioural characteristics common to eating disorders, and takes approximately 20 minutes to complete. The EDI consists of eight





subscales: (1) Drive for Thinness, (2) Bulimia, (3) Body Dissatisfaction, (4) Ineffectiveness, (5) Perfectionism, (6) Interpersonal Distrust, (7) Interoceptive Awareness, and (8) Maturity Fears. The first three subscales are thought to measure eating attitudes and behaviours pertaining to eating, body weight and shape. The last five subscales are thought to measure general psychological traits associated with individuals who have eating disorders.

Responses are on a six point scale, ranging from “always” to “never.” However, when scored, responses are weighted from zero to three. Thus, responses from one to three are weighted as zero, a response of four is given a weight of one, a response of five is given a weight of two, and a response of six is given a weight of three, for positively scored items (Garner et al., 1983). The EDI is commonly used in the literature, and has demonstrated good internal consistency (Cronbach’s alpha for the subscales range from .80-.92; Garner, 1991). The EDI has been extensively used in athletic and university populations.

### **Questionnaire for Eating Disorder Diagnosis (Q-EDD)**

The Questionnaire for Eating Disorder Diagnosis (Appendix H) (Q-EDD; Mintz et al., 1997) was used to operationalize eating disorders according to current *DSM-IV* criterion, and to measure prevalence of pathogenic weight control behaviours. In addition, one item on the Q-EDD (i.e., “Do you exercise a lot?”) was used to examine exercise behaviour of the athletes and control group. The Q-EDD was used as it operationalizes a full spectrum of eating disorders, and may help prevent previous problems associated with measuring eating disorders in past research, such as using outdated criteria, or de novo questionnaires (Mintz et al., 1997), which may limit



generalizability and replication. The Q-EDD is a 50 item self-report instrument, and takes between 5-10 minutes to complete. The Q-EDD yields both frequency (e.g., self-induced vomiting) and categorical (e.g., eating disordered and noneating disordered) data. Categorical data are dichotomously scored (yes or no) and frequency data are scored according to guidelines provided by Mintz et al. (1997).

The Q-EDD is a relatively new instrument, and has demonstrated good reliability (test retest kappa = .85-.94) and convergent validity (assessed by comparing Q-EDD scores to other standardized instruments, e.g., the EDI) in a series of studies establishing initial psychometric properties, in female college students and women with eating disorders (Mintz et al., 1997). The Q-EDD has also demonstrated good incremental validity (accuracy rate between .94-.97, false negative rate .22, false positive rate .02-.05, sensitivity .78 and specificity .95) (Mintz et al., 1997). Given that the treatment and outcome of eating disorders are relatively poor (Hsu, 1995; Steinhausen, 1995), indicators that are highly specific are desirable (Fletcher, Fletcher & Wagner, 1988).

### **Dutch Eating Behaviour Questionnaire-Restraint Scale (DEBQ-R)**

The Restrained Eating Scale from the Dutch Eating Behaviour Questionnaire (Appendix I) (DEBQ-R; van Strien, Frijters, Bergers, & Defares, 1986) was used to assess restrained eating behaviours. The DEBQ-R is a 10 item self-report questionnaire used to measure eating behaviours related to deliberate planned weight control. The DEBQ-R generally takes under 5 minutes to complete. Responses are scored on a five point Likert-type scale, ranging from "never" to "very often". Two items also contain a sixth "not relevant" response. Individuals who respond "not relevant" to those items are subsequently disregarded in analysis (van Strien et al., 1986, p. 751). The DEBQ-R has



demonstrated good internal consistency (Cronbach's  $\alpha \geq .90$ ) (Gorman & Allison, 1995).

### **Anthropometric Measures**

Height was measured as the distance from the floor to the vertex, using a set square. Participants were asked to stand bare foot against a wall, and height was recorded to the nearest .5 cm.

Weight was measured on a “Health Meter” dial scale, with participants wearing minimal clothing and no shoes, to the nearest .5 kg.

Five skinfold measures were taken (biceps, triceps, subscapular, medial calf and supra iliac) by two trained research assistants with Harpenden skinfold calipers according to the procedures of the Canadian Standardized Test of Fitness (Health Canada, 1996). Inter-rater reliability of  $R = .95$  for skinfold assessment was established for these two testers prior to the study.

### **Analyses of Data**

Descriptive statistics were reported for both groups (i.e., athlete and control) for demographic and anthropometric data, and for the EDI, DEBQ-R, and categorical data from the Q-EDD. Descriptive statistics were also reported for training data reported by male and female athletes.

To determine if differences existed between male and female athletes, and between female athletes and controls, and male athletes and controls on the EDI, a MANOVA was performed. An ANOVA was used to further examine potential differences between male and female athletes, when the sample size was appropriate. In addition, an ANOVA was used to determine possible differences between male and





female athletes, and athletes and controls, for the DEBQ-R. For the Q-EDD data, a Chi-Square test was used to determine possible differences in proportions between male and female athletes, and between athletes and controls. Alpha level for all statistical analyses was set a priori at 0.05.



## IV. RESULTS

### Participants

The sample included 165 competitive varsity athletes (females  $N = 101$ ; males  $N = 64$ ) from 9 sport domains on 16 different teams (men's and women's basketball, cross country, ice hockey, soccer, track and field, volleyball and wrestling, and women's field hockey and rugby) and 132 non-athlete undergraduate students (females  $N = 95$ ; males  $N = 37$ ) from the University of Alberta (refer to Tables 2 & 3). As stated previously, the controls were required to not be engaging in vigorous physical activity, four or more times per week. In response to the Q-EDD, 80% ( $N = 107$ ) of the controls indicated that they only exercised four times per week or less, confirming that in general the controls met the exercise requirements of the study.

The athlete group represented 61% of athletes from the University of Alberta on CIAU team rosters. Overall, female athletes (66% response rate,) were more likely to participate in the study than male athletes (54% response rate). There was considerable range in response rates in the teams. For females, the lowest response rate was reported for the soccer team (36%), and the highest response for the basketball team (93%). For males, the lowest response was reported for the track and field team (2%), and the highest response was reported for the volleyball team (93%). Two teams, swimming and football, did not participate in the study, due to time restrictions (swimming) and coaching changes (football). For the control group, the response rate is estimated to be between 30-35%. However, the actual response rate is unknown, as the classes where controls were recruited from were very large, and attendance on the days of recruiting was not taken by the investigator.



Table 2. Physical Data (females)

|               | N<br>(response<br>rates) | Age      |           | Height (cm.)        |           | Weight (kg.) |           | SO5S (mm.)         |           | BMI      |           |
|---------------|--------------------------|----------|-----------|---------------------|-----------|--------------|-----------|--------------------|-----------|----------|-----------|
|               |                          | <u>M</u> | <u>SD</u> | <u>M</u>            | <u>SD</u> | <u>M</u>     | <u>SD</u> | <u>M</u>           | <u>SD</u> | <u>M</u> | <u>SD</u> |
| Basketball    | 14/15<br>(93%)           | 21.21    | 2.04      | 174.35              | 6.52      | 70.46        | 5.30      | 65.42              | 12.45     | 23.22    | 1.90      |
| Cross country | 4/6<br>(67%)             | 20.25    | .50       | 161.12              | 4.68      | 54.87        | 5.60      | 47.07              | 19.24     | 21.08    | .90       |
| Field Hockey  | 13/20<br>(65%)           | 19.69    | 1.37      | 164.35              | 7.54      | 62.19        | 11.56     | 61.26              | 18.46     | 22.84    | 2.73      |
| Ice Hockey    | 20/22<br>(91%)           | 20.65    | 2.20      | 165.91              | 5.09      | 64.02        | 8.31      | 72.08              | 21.31     | 23.22    | 2.55      |
| Rugby         | 19/30<br>(63%)           | 20.15    | 1.50      | 165.57              | 5.00      | 67.57        | 10.83     | 76.73              | 28.83     | 24.61    | 3.50      |
| Soccer        | 9/25<br>(36%)            | 21.11    | 2.57      | 164.95              | 6.82      | 58.11        | 6.79      | 59.61              | 14.21     | 21.30    | 1.48      |
| Track & Field | 7/8<br>(88%)             | 20.57    | 3.04      | 170.50              | 6.25      | 62.00        | 4.79      | 46.41              | 7.67      | 21.33    | 1.41      |
| Volleyball    | 10/16<br>(63%)           | 19.60    | 1.34      | 176.89              | 5.89      | 72.05        | 9.07      | 67.42              | 17.06     | 22.98    | 2.29      |
| Wrestling     | 5/10<br>(50%)            | 19.20    | 1.64      | 162.90              | 6.43      | 64.30        | 1.92      | 74.52              | 21.81     | 24.34    | 2.41      |
| Athlete Total | 101/152<br>(66%)         | 20.21    | 1.92      | 167.79 <sub>a</sub> | 7.41      | 65.12        | 9.39      | 66.42 <sub>a</sub> | 21.30     | 23.08    | 2.65      |
| Controls      | 95                       | 20.13    | 2.62      | 164.67 <sub>a</sub> | 6.20      | 62.62        | 8.33      | 82.53 <sub>a</sub> | 22.82     | 23.08    | 2.78      |

*Note:* No subscripts are given for analyses that did not yield significant group differences. For analysis that yielded significant group differences, subscripts are included. Means with the same subscripts differ significantly ( $p < .05$ ).



Table 3. Physical Data (males)

|               | N               | Age                |           | Height (cm.)        |           | Weight (kg.) |           | SO5S (mm.)         |           | BMI                |           |
|---------------|-----------------|--------------------|-----------|---------------------|-----------|--------------|-----------|--------------------|-----------|--------------------|-----------|
|               |                 | <u>M</u>           | <u>SD</u> | <u>M</u>            | <u>SD</u> | <u>M</u>     | <u>SD</u> | <u>M</u>           | <u>SD</u> | <u>M</u>           | <u>SD</u> |
| Basketball    | 7/13<br>(54%)   | 21.42              | .97       | 196.11              | 7.55      | 93.57        | 6.46      | 38.02              | 6.52      | 24.35              | 1.50      |
| Cross country | 4/7<br>(57%)    | 22.50              | 2.08      | 175.40              | 6.00      | 66.87        | 5.12      | 32.40              | 4.67      | 21.71              | .72       |
| Ice Hockey    | 10/30<br>(33%)  | 21.90              | 1.37      | 184.43              | 8.62      | 89.90        | 10.14     | 52.68              | 13.82     | 26.41              | 2.30      |
| Soccer        | 13/18<br>(72%)  | 21.38              | 2.66      | 178.74              | 4.98      | 77.73        | 7.01      | 48.33              | 13.70     | 24.30              | 1.69      |
| Track & Field | 3/15<br>(2%)    | 21.33              | 1.52      | 180.43              | 9.08      | 77.50        | 9.52      | 36.41              | 13.32     | 23.74              | .95       |
| Volleyball    | 14/15<br>(93%)  | 21.14              | 1.35      | 190.29              | 8.14      | 89.35        | 9.91      | 44.13              | 10.41     | 24.69              | 2.40      |
| Wrestling     | 13/20<br>(65%)  | 20.76              | 2.27      | 172.49              | 6.73      | 74.15        | 12.15     | 39.52              | 18.13     | 24.80              | 3.00      |
| Athlete Total | 64/118<br>(54%) | 21.35 <sub>a</sub> | 1.88      | 182.65 <sub>a</sub> | 10.44     | 82.49        | 12.21     | 43.62 <sub>a</sub> | 13.92     | 24.63 <sub>a</sub> | 2.36      |
| Controls      | 37              | 22.78 <sub>a</sub> | 4.86      | 174.89 <sub>a</sub> | 6.22      | 79.75        | 13.11     | 69.82 <sub>a</sub> | 27.93     | 26.01 <sub>a</sub> | 3.65      |

Note: No subscripts are given for analyses that did not yield significant group differences. For analysis that yielded significant group differences, subscripts are included. Means with the same subscripts differ significantly ( $p < .05$ ).





## **Physical Data**

### Females

The physical characteristics of female athletes and controls are presented in Table 2. Female athletes were significantly taller (167.79 cm. versus 164.67 cm;  $F = 10.18$ ,  $p = .002$ ), and leaner (SO5S = 66.42 mm. versus 82.53 mm.;  $F = 26.13$ ,  $p < .001$ ) than controls. Female athletes did not significantly differ in age (20.21 years versus 20.13 years), weight (65.12 kg. versus 62.62 kg.) or BMI (23.08 versus 23.08) compared to controls

### Males

The physical characteristics of male athletes and controls are presented in Table 3. Male athletes were significantly younger (21.35 versus 22.78 years;  $F = 4.73$ ,  $p = .03$ ), taller (182.65 cm. versus 174.89 cm;  $F = 16.92$ ,  $p < .001$ ), leaner (SO5S = 43.6 mm. versus 69.82 mm.;  $F = 39.53$ ,  $p < .001$ ), and had lower BMI's (24.63 versus 26.01;  $F = 5.23$ ,  $p = .02$ ) than controls. There were no significant differences in weight (82.4 kg. versus 79.7 kg) between the two groups.

## **Athlete Training Data**

Training data for female and male athletes are presented in Tables 4 and 5 respectively. On average, both male and female athletes were in their 2<sup>nd</sup> year on a varsity team, trained 5 days per week, and engaged in personal workouts 3 days per week. In total, male and female athletes spent an average of 15 hours per week training. There were no significant differences between males and females relative to training data.



**Table 4. Training Data (female athletes)**

|                  | Years on team |          |           | Team training<br>(days/week) |           |  | Personal workouts<br>(days/week) |           |  | Total training<br>(hours/week) |           |  |
|------------------|---------------|----------|-----------|------------------------------|-----------|--|----------------------------------|-----------|--|--------------------------------|-----------|--|
|                  | <u>N</u>      | <u>M</u> | <u>SD</u> | <u>M</u>                     | <u>SD</u> |  | <u>M</u>                         | <u>SD</u> |  | <u>M</u>                       | <u>SD</u> |  |
| Basketball       | 14            | 2.21     | 1.47      | 5.07                         | 1.59      |  | 3.71                             | 1.77      |  | 17.64                          | 3.62      |  |
| Cross<br>country | 4             | 2.5      | 1.00      | 5.00                         | 1.15      |  | 3.25                             | 2.21      |  | 15.00                          | .81       |  |
| Field<br>Hockey  | 13            | 1.92     | 1.32      | 5.19                         | .56       |  | 3.38                             | 1.45      |  | 16.57                          | 3.78      |  |
| Ice Hockey       | 20            | 2.40     | 1.31      | 5.21                         | .91       |  | 1.83                             | 1.04      |  | 12.00                          | 3.84      |  |
| Rugby            | 19            | 1.47     | .51       | 4.36                         | 1.16      |  | 3.86                             | 1.26      |  | 12.63                          | 4.61      |  |
| Soccer           | 9             | 2.66     | 1.50      | 4.88                         | 1.16      |  | 1.66                             | 1.41      |  | 14.22                          | 3.73      |  |
| Track &<br>Field | 7             | 2.14     | 1.67      | 6.00                         | .00       |  | 1.42                             | 1.13      |  | 14.71                          | 4.27      |  |
| Volleyball       | 10            | 1.7      | .94       | 5.22                         | .44       |  | 2.88                             | 2.08      |  | 19.55                          | 2.87      |  |
| Wrestling        | 5             | 2.20     | 1.64      | 4.80                         | .44       |  | 2.20                             | 1.64      |  | 11.90                          | 1.94      |  |
| Total*           | 101           | 2.07     | 1.27      | 5.06                         | 1.05      |  | 2.83                             | 1.66      |  | 14.77                          | 4.47      |  |

\* No differences versus males (Table 5) for any variables



Table 5. Training Data (male athletes)

|                  | Years on team |      |      | Team training<br>(days/week) |      |  | Personal workouts<br>(days/week) |      |  | Total training<br>(hours/week) |      |  |
|------------------|---------------|------|------|------------------------------|------|--|----------------------------------|------|--|--------------------------------|------|--|
|                  | N             | M    | SD   | M                            | SD   |  | M                                | SD   |  | M                              | SD   |  |
| Basketball       | 7             | 3.14 | 1.67 | 5.57                         | .53  |  | 2.42                             | 1.13 |  | 15.21                          | 1.72 |  |
| Cross<br>country | 4             | 2.50 | 1.00 | 5.00                         | 1.15 |  | 3.25                             | 2.21 |  | 15.00                          | .81  |  |
| Ice Hockey       | 10            | 1.80 | 1.03 | 5.20                         | 1.03 |  | 2.50                             | 1.95 |  | 14.05                          | 5.58 |  |
| Soccer           | 13            | 2.07 | 1.38 | 4.40                         | 1.57 |  | 3.20                             | 2.09 |  | 12.70                          | 2.62 |  |
| Track &<br>Field | 3             | 1.66 | 1.15 | 5.33                         | 1.15 |  | .66                              | .57  |  | 14.50                          | .86  |  |
| Volleyball       | 14            | 1.92 | 1.26 | 5.64                         | .49  |  | 3.78                             | 1.54 |  | 18.21                          | 2.85 |  |
| Wrestling        | 13            | 1.76 | .83  | 4.84                         | .68  |  | 3.66                             | 2.42 |  | 15.84                          | 5.74 |  |
| Total*           | 64            | 2.06 | 1.23 | 5.13                         | 1.00 |  | 3.10                             | 1.96 |  | 15.38                          | 4.22 |  |

\* No differences versus females (Table 4) for any variables





## Eating Behaviour

The EDI, DEBQ-R, and Q-EDD assessed eating attitudes and behaviours. Missing data ( $N = 2/101$ , 1.9% female athletes) from the EDI, and Q-EDD ( $N = 1/101$ , 0.9% female athletes) were excluded from the analyses. According to the authors of the DEBQ-R (van Strien et al., 1986), a “not relevant” response indicates that the “respondent has never eaten too much or gained weight” (p.751), and such responses should be excluded from analysis. Thus, nine females ( $N = 7/101$ , 6.9% athletes;  $N = 2/95$ , 2.1% controls) and 13 males ( $N = 8/64$ , 12.5% athletes;  $4/34$ , 11.7% controls) were eliminated from the DEBQ-R analysis.

### Hypothesis One

The first hypothesis stated that female athletes would exhibit more disordered eating attitudes and behaviours, including restrained eating, and would thus score higher on the EDI, DEBQ-R, and Q-EDD than male athletes. Prevalence rates of eating disorders were also assessed by the Q-EDD, and it was hypothesized that female athletes would have higher prevalence rates for eating disorders than male athletes.

Results for the EDI, for male and female athletes and controls are presented in Table 6. A MANOVA (Wilk's  $\lambda = .787$ ,  $F_{8, 154} = 5.20$ ,  $p < .001$ ) revealed that there were significant differences on two of the EDI subscales, Body Dissatisfaction ( $F = 23.17$ ,  $p < .001$ ) and Perfectionism ( $F = 5.64$ ,  $p = .01$ ). While the females scored higher on Body Dissatisfaction than males, the males scored higher on Perfectionism than females.

To test whether female athletes engaged in more restrained eating (Table 7), as measured by the DEBQ-R than males, an Oneway ANOVA was used. Although the sample size between the two groups was unequal, Levene's test for homogeneity of



**Table 6. Mean and Standard Deviations of EDI subscales for athletes and controls.**

|                            | Drive for Thinness |      | Body Dissatisfaction |      | Bulimia |      | Interceptive Awareness |      | Ineffectiveness   |      | Maturity Fears |      | Perfectionism     |      | Interpersonal Distrust |      |
|----------------------------|--------------------|------|----------------------|------|---------|------|------------------------|------|-------------------|------|----------------|------|-------------------|------|------------------------|------|
|                            | M                  | SD   | M                    | SD   | M       | SD   | M                      | SD   | M                 | SD   | M              | SD   | M                 | SD   | M                      | SD   |
| Female                     |                    |      |                      |      |         |      |                        |      |                   |      |                |      |                   |      |                        |      |
| Athletes (N=99)            | 2.04 <sub>b</sub>  | 3.95 | 5.72 <sub>a,b</sub>  | 6.25 | .86     | 1.87 | 1.09 <sub>b</sub>      | 1.98 | 1.08 <sub>b</sub> | 2.13 | 2.11           | 2.46 | 4.93 <sub>a</sub> | 2.94 | 1.55                   | 2.49 |
| Female Controls (N=95)     | 5.24 <sub>b</sub>  | 5.39 | 10.01 <sub>b</sub>   | 7.09 | 1.36    | 2.26 | 2.21 <sub>b</sub>      | 2.97 | 1.92 <sub>b</sub> | 2.77 | 2.54           | 3.17 | 5.27              | 3.38 | 1.64                   | 2.23 |
| Female                     |                    |      |                      |      |         |      |                        |      |                   |      |                |      |                   |      |                        |      |
| College Norms <sup>1</sup> | 5.5                | 5.5  | 12.2                 | 8.3  | 1.2     | 1.9  | 3.0                    | 3.9  | 2.3               | 3.6  | 2.7            | 2.9  | 6.2               | 3.9  | 2.0                    | 3.1  |
| Male                       |                    |      |                      |      |         |      |                        |      |                   |      |                |      |                   |      |                        |      |
| College Norms <sup>1</sup> | 2.2                | 4.0  | 4.9                  | 5.6  | 1.0     | 1.7  | 2.0                    | 3.0  | 1.8               | 3.0  | 2.8            | 3.4  | 7.1               | 4.7  | 2.4                    | 2.5  |
| Male                       |                    |      |                      |      |         |      |                        |      |                   |      |                |      |                   |      |                        |      |
| Athletes (N = 62)          | 1.61               | 2.87 | 1.67 <sub>a,c</sub>  | 2.72 | 1.04    | 2.44 | 1.12                   | 3.18 | 1.16              | 3.78 | 2.66           | 3.52 | 6.17 <sub>a</sub> | 3.69 | 2.25                   | 3.61 |
| Male Controls (N =37)      | 1.89               | 2.35 | 4.91 <sub>c</sub>    | 4.94 | .56     | 1.16 | 1.67                   | 1.98 | 1.70              | 2.80 | 1.54           | 1.80 | 5.45              | 3.74 | 1.89                   | 1.89 |

*Note:* No subscripts are given for analyses that did not yield significant group differences. For analysis that yielded significant group differences, subscripts are included. Means with the same subscripts differ significantly ( $p < .05$ ). Comparisons were made between three groups only (a) female and male athletes, (b) female athletes and female controls, (c) male athletes and male controls.

<sup>1</sup> Mean scale scores from Garner, 1991



variance indicated that the two groups had similar variances (Levene Statistic = 1.25,  $p = .26$ ) on the DEBQ-R. There were no significant ( $F = 2.84$ ,  $p = .09$ ) differences between male and female athletes on the restrained eating measure.

**Table 7. DEBQ-R Mean and Standard Deviations for athletes**

|                 | N  | M     | SD  |
|-----------------|----|-------|-----|
| Female Athletes | 94 | 2.25* | .82 |
| Male Athletes   | 56 | 2.00* | .88 |

\* no significant difference between the two groups

The prevalence of problematic eating and/or weight restricting behaviours was measured by the Q-EDD (Table 8). To test for differences among male and female athletes on each of the behaviours listed in Table 8, when cell size was appropriate (i.e.,  $> 5$ ), a Chi – Square statistic was used. Cell counts less than five were not analyzed as Thompson (1988) warns that small cell counts can inflate the Chi – Square test statistic, and thus artificially increase the chance of finding significance. There was no statistically significant difference in binge eating between female and male athletes, with 16.0% ( $N=16$ ) of the females, and 26.6% ( $N = 17$ ) of the males reporting episodes of binge eating. However, significantly ( $\chi^2 = 7.886$   $df = 1$ ,  $p = .005$ ,  $N = 165$ ) more female athletes (56.3%,  $N = 9/16$ ) than male athletes (11.1%,  $N = 2/17$ ) reported feeling out of control during the binge episode, which is necessary to meet the clinical criteria of binge eating (i.e., experiencing uncontrollable episodes of eating large quantities of food in a small period of time). There were no significant differences among male and female athletes for strict dieting behaviour (15.6%,  $N = 10$  versus 9.0%,  $N = 9$ , respectively).

According to the Q-EDD, 3 (3%) female athletes presented with eating disorder symptoms in accordance with *DSM-IV* criteria. Specifically, the Q-EDD classified 2 female athletes with Bulimia Nervosa (purging type), and 1 female athlete with Exercise



**Table 8. Prevalence of Problematic Eating/Weight Restricting Behaviors (Q-EDD)**

|                                  | Athlete Group               |                             | Control Group       |                   |
|----------------------------------|-----------------------------|-----------------------------|---------------------|-------------------|
|                                  | Females<br>(N = 100)        | Males<br>(N = 64)           | Females<br>(N = 95) | Males<br>(N = 34) |
| Engage in binge eating           | 16.0 % (N=16)               | 26.6% (N=17)                | 16.8% (N=16)        | 27% (N=10)        |
| Feel out of control during binge | 56.3% (N=9/16) <sub>a</sub> | 11.1% (N=2/17) <sub>a</sub> | 62.5% (N=10/16)     | 10% (N=1/10)      |
| Make yourself vomit              | 2% (N=2)                    | 1.6% (N=1)                  | 5.3% (N=5)          | 0% (N=0)          |
| Take laxatives                   | 2% (N=2)                    | 1.6% (N=1)                  | 1.1% (N=1)          | 0% (N=0)          |
| Take diuretics                   | 1% (N=1)                    | 1.6% (N=1)                  | 0% (N=0)            | 0% (N=0)          |
| Fast for 24 hours                | 1% (N=1)                    | 15.6% (N=10)                | 5.3% (N=5)          | 2.7% (N=1)        |
| Chew but spit out food           | 1% (N=1)                    | 1.6% (N=1)                  | 3.2% (N=3)          | 0% (N=0)          |
| Give yourself an enema           | 0% (N=0)                    | 1.6% (N=1)                  | 0% (N=0)            | 0% (N=0)          |
| Take appetite control pills      | 2% (N=2)                    | 1.6% (N=1)                  | 3.2% (N=3)          | 0% (N=0)          |
| Diet strictly                    | 9.0% (N=9)                  | 15.6 % (N=10)               | 14.8% (N=14)*       | 5.4% (N=2)        |

*Note:* No subscripts are given for analyses that did not yield significant group differences. For analysis that yielded significant group differences, subscripts are included. Means with the same subscripts differ significantly ( $p < .05$ ). Comparisons were made between three groups only (a) female and male athletes, (b) female athletes and female controls, (c) male athletes and male controls.  
 \* one participant did not answer this item





Bulimia (i.e., individual meets all criteria for Bulimia Nervosa except that the compensatory behaviour is exercise). There were 3 (4.7%) male athletes who were classified by the Q-EDD with eating disorder symptoms in accordance with the *DSM-IV* criteria. Specifically the Q-EDD classified 1 male athlete with Bulimia Nervosa (purging type), and 2 male athletes with Eating Disorder Not Otherwise Specified (NonBingeing Bulimia). A Chi - Square test was used to compare the proportion of eating disordered and non-eating disordered among the female and male athletes (Table 9). The proportion of female athletes classified with an eating disorder was not significantly different than the proportion of male athletes ( $\chi^2 = .330$ ,  $df = 1$ ,  $p = .56$ ,  $N = 165$ ).

**Table 9. Q-EDD classification of eating disorders among male and female athletes**

|                       | Male Athletes | Female Athletes |
|-----------------------|---------------|-----------------|
| Eating disordered     | 3* (4.7%)     | 3* (3.0%)       |
| Non-eating Disordered | 61 (95.3%)    | 97 (97.0%)      |
| Total                 | 64 (100%)     | 101 (100%)      |

\*no significant differences between the two groups.

Athletes ( $N = 3$  females;  $N = 3$  males) who were classified by the Q-EDD as symptomatic for an eating disorder were removed from the analysis, to help eliminate any bias that might arise from having individuals with potentially clinical problems in the sample. Subsequently, EDI and DEBQ-R data were reanalyzed. Surprisingly, there were no changes in the previously reported relationships for the EDI subscales (i.e., differences were found for only two subscales, with females higher on Body Dissatisfaction, males higher on Perfectionism). However, female athletes ( $M=2.19$ ,  $SD=.76$ ) reported a significantly ( $F=4.56$ ,  $p=.03$ ) higher degree of restrained eating than male athletes ( $M$



=1.90,  $SD = .77$ ), supporting the original hypothesis that female athletes would engage in a higher degree of restrained eating than male athletes.

The hypothesis of differences between male and female athletes was further explored by comparing males and females within their own sport domain. Four sport domains (basketball, ice hockey, soccer and volleyball) that involved both male and female athletes and that had an adequate sample size were examined further.

Significant differences between male and female athletes were found in basketball, where females ( $M = 2.59$ ,  $SD = .91$ ) scored significantly ( $F = 6.69$ ,  $p = .01$ ) higher than males ( $M = 1.48$ ,  $SD = .76$ ) on the measure of restrained eating (i.e., DEBQ-R). There were no significant differences on restrained eating, measured by the DEBQ-R, between male and female ice hockey, soccer and volleyball players. Further, there were no significant differences on eating attitudes and behaviours, as measured by the EDI, between male and female basketball, ice hockey, soccer and volleyball players.

### **Hypothesis Two**

The second hypothesis stated that athletes would report more disordered eating attitudes and behaviours, including restrained eating, and thus would score higher on the EDI, DEBQ-R, and Q-EDD, than controls. Prevalence rates of eating disorders were also assessed by the Q-EDD. It was hypothesized that female athletes would have higher prevalence rates than female controls, and likewise male athletes would have higher prevalence rates than male controls. Male athletes ( $N = 64$ ) and male controls ( $N = 37$ ) were compared to one another and female athletes ( $n = 101$ ) and female controls ( $N = 95$ ) were compared to one another.



A MANOVA revealed that there were significant differences (Wilk's  $\lambda = .848$ ,  $F_{8, 187} = 4.20$ ,  $p < .001$ ) on the EDI between female athletes and controls. Contrary to the hypothesis, female controls scored significantly higher than female athletes on four EDI subscales (Table 6): Drive For Thinness ( $F = 22.52$ ,  $p < .001$ ), Body Dissatisfaction ( $F = 20.17$ ,  $p < .001$ ), Interceptive Awareness ( $F = 9.58$ ,  $p = .002$ ) and Ineffectiveness ( $F = 5.64$ ,  $p = .018$ ).

A MANOVA also revealed that there were significant differences (Wilk's  $\lambda = .713$ ,  $F_{8, 90} = 4.52$ ,  $p < .001$ ) on the EDI between male athletes and controls. Again, contrary to the hypothesis, male controls scored significantly higher than male athletes on one EDI subscale (Table 6), Body Dissatisfaction ( $F = 17.72$ ,  $p < .001$ ).

To examine differences on the DEBQ-R for restrained eating (Table 10), an Oneway ANOVA was used. Contrary to the hypothesis, female controls were engaging in a significantly higher degree of restrained eating ( $F = 18.56$ ,  $p < .001$ ) than female athletes. Although the sample size between the female athlete and control groups was unequal, Levene's test for homogeneity of variance indicated that the two groups had similar variances (Levene Statistic = .025,  $p = .87$ ) on the DEBQ-R. There were no significant differences found between male athletes and male controls for restrained eating behaviours.





**Table 10. DEBQ-R (Mean and Standard Deviations)**

|                 | <u>N</u> | <u>M</u>          | <u>SD</u> |
|-----------------|----------|-------------------|-----------|
| Female Athletes | 94       | 2.25 <sub>a</sub> | .82       |
| Female Controls | 93       | 2.76 <sub>a</sub> | .81       |
| Male Athletes   | 56       | 2.00              | .88       |
| Male Controls   | 32       | 2.22              | .65       |

*Note:* No subscripts are given for analyses that did not yield significant group differences. For analysis that yielded significant group differences, subscripts are included. Means with the same subscripts differ significantly ( $p < .05$ ).

The prevalence of problematic eating and/or weight restricting behaviours in male and female athletes and controls was recorded by the Q-EDD (Table 8). A Chi – Square test was used to test for differences between female athletes and controls, and male athletes and controls, for each behaviour (when the cell size was appropriate). There were no statistically significant differences found for any of the problematic behaviours.

According to the Q-EDD, 12 (12.6%) female controls, and no male controls, reported eating disorder symptoms in accordance with *DSM-IV* criteria. Specifically, the Q-EDD classified 9 female controls with Eating Disorder Not Otherwise Specified (N = 1 symptomatic for Anorexia Nervosa; N=1 Binge Eating Disorder; N=2 Chew/Spitters only; N=5 NonBingeing Bulimia). One female control was classified with both Bulimia Nervosa (purging type) and as being symptomatic for anorexia nervosa. Another was classified with Subthreshold Bulimia, and another female control with Exercise Bulimia. As reported earlier, 3 female athletes and 3 male athletes presented with eating disorder symptoms in accordance with *DSM-IV* criteria.

A Chi – Square test was used to compare the proportion of eating disordered and non-eating disordered among female athletes and female controls (Table 11). This test demonstrated that there was a significantly ( $\chi^2 = 6.465$ ,  $df = 1$ ,  $p = .01$ ,  $N = 196$ ) greater



proportion of eating disordered female controls when compared to female athletes. As there were no male controls classified with an eating disorder, an analysis was not conducted between male athletes and controls.

**Table 11. Q-EDD classification of eating disorders among female athletes and controls.**

|                       | Female Athletes       | Female Controls         |
|-----------------------|-----------------------|-------------------------|
| Eating disordered     | 3 (3.0%) <sub>a</sub> | 12 (12.6%) <sub>a</sub> |
| Non-eating Disordered | 98 (97.0%)            | 83 (87.4%)              |
| Total                 | 101 (100%)            | 95 (100%)               |

*Note:* subscript <sub>a</sub> denotes significant differences ( $p = .01$ ) between the two groups

As done previously, individuals ( $N = 12$  female controls;  $N = 3$  female athletes;  $N = 3$  male athletes) who were classified by the Q-EDD as symptomatic for an eating disorder were removed from the analyses, and the EDI and DEBQ-R data were reanalyzed for comparisons between the female athletes and control group, and the male athlete and control group.

A MANOVA revealed that between female athletes and controls, there were still significant differences (Wilk's  $\lambda = .848$ ,  $F_{8, 172} = 3.86$ ,  $p < .001$ ) on the EDI. However, differences were now found on only three subscales: Drive for Thinness ( $F = 25.76$ ,  $p < .001$ ), Body Dissatisfaction ( $F = 16.51$ ,  $p < .001$ ), and Interoceptive Awareness ( $F = 5.54$ ,  $p = .020$ ), with female controls still scoring significantly higher than female athletes. Previously, there was also a significant difference found for the Ineffectiveness subscale. There was no change in restrained eating, as measured by the DEBQ-R. That is, female controls continued to report a significantly higher degree of restrained eating than female athletes. Additionally, although the sample size between the two groups was unequal,



Levene's test for homogeneity of variance indicated that the two groups had similar variances (Levene Statistic = .340,  $p = .56$ ) on the DEBQ-R.

A MANOVA revealed that between male athletes and controls, there were still significant differences (Wilk's  $\lambda = .693$ ,  $F_{8, 87} = 4.18$ ,  $p < .001$ ) on the EDI. However, differences were now found on three EDI subscales: Ineffectiveness ( $F = 5.51$ ,  $p = .021$ ), Body Dissatisfaction ( $F = 21.84$ ,  $p < .001$ ), and Interceptive Awareness ( $F = 7.51$ ,  $p = .007$ ), with male controls scoring significantly higher than male athletes. Previously, there was only a significant difference found for the Body Dissatisfaction subscale, with male controls scoring higher than the athletes. There was no change in restrained eating, as measured by the DEBQ-R. That is, no significant differences were found between male controls and athletes.



## V. DISCUSSION

This was a cross sectional study designed to assess the prevalence of eating disorders, and examine eating attitudes and behaviours in male and female CIAU athletes at the University of Alberta. There were two research questions. One, are female athletes more likely to exhibit disordered eating attitudes and behaviours than male athletes? Two, are athletes more likely to exhibit disordered eating attitudes and behaviours than controls?

This study was important for several reasons. First, there are no Canadian studies that examine prevalence rates of eating disorders in male and female CIAU athletes across a variety of sport domains. Second, there are very few large-scale studies that examine eating attitudes and behaviours in athletes from a variety of sports domains, especially Canadian studies. Third, few studies include and compare male athletes to female athletes. Fourth, many studies examining eating attitudes and behaviours in athletes are fraught with methodological errors. Thus, while many researchers generally conclude that athletes are “at risk” for eating disorders, the research findings are equivocal. However, it is important to note that the majority of athletes examined in this study do not come from sports thought to be potentially problematic for eating disorders, such as sports with a strong aesthetic component (e.g., gymnastics).

This sample consisted of 165 CIAU athletes (101 females and 64 males) from 16 teams representing 9 sports, and 132 undergraduate students (95 females and 37 males), from the University of Alberta. The athlete group represented 61% of the athletes on CIAU team rosters at the University of Alberta who participated in this study. This is a common response rate for psychological survey research (Krosnick, 1999), and is similar





to response rates of previous research examining eating attitudes and behaviours in athletes (e.g., Parker, Lambert, & Burlingame, 1994). In general, teams with female athletes were more likely to participate in the study (66% response rate) than male athletes (54% response rate). Thirty-nine percent of the athletes on teams involved in the study chose not to participate in this study. Due to this relatively high number of absent athletes, and the fact that athletes tend to underreport disordered eating attitudes and behaviours (Sundgot-Borgen, 1994b), the results found are probably a conservative assessment of the eating attitudes and behaviours of athletes.

### **Physical Characteristics**

Female athletes were significantly taller, and had skinfold values (measured by SO5S) than female controls. Female athletes may have been taller than controls due to self selection in some of the sports contained within the sample (e.g., basketball, volleyball). One might expect female athletes to be leaner than controls, since the athletes were more physically active than the controls. When compared to Health Canada (1996) norms for SO5S, female athletes were considered to have a healthy amount of body fat (approximately the 40<sup>th</sup> percentile; Health Canada, 1986), while the controls were above healthy norms for SO5S (approximately the 20<sup>th</sup> percentile; Health Canada, 1986). There were no differences between female athletes and controls in age, weight or BMI. It is not surprising that there were no differences in age between female athletes and controls since, on average, female athletes were only in their second year on a varsity team, and controls were sought mainly from first and second year undergraduate courses.

Male athletes were significantly younger, taller, had a lower BMI, and lower skinfold values (measured by SO5S) than male controls. Although the male athletes were



younger, the difference between the two groups may be due to the larger range in age within the control group (18 – 26 years versus 18 – 36 years, respectively). Athletes in certain sports, such as basketball and volleyball, may be more likely to be taller due to the requirements of the sport. While there were no differences in weight between the two groups, male athletes were more physically active than the controls, which likely resulted in the lower BMI's and lower body fat values found in the athletes. According to Health Canada (1996) norms for SO5S, male athletes on average had a healthy amount of body fat (approximately the 50<sup>th</sup> percentile; Health Canada, 1986), while the controls were above the recommended range of healthy body fat (approximately the 20<sup>th</sup> percentile; Health Canada, 1986).

The average age of male and female athletes is similar to previous research examining eating attitudes and behaviours of athletes (Johnson et al., 1999). Previous research has also found no significant differences in weight between athletes and controls (Wilkins et al., 1991). Petrie (1996) found no differences between athletes and controls for BMI, and Enns, Drewnowski, & Grinker (1987) found that skinfold values for male athletes were significantly lower than those reported for non-athletic males of the same age, which is similar to results found in this study.

### **Athlete Training Data**

There were no significant differences between male and female athletes on training data. This may suggest that involvement on a varsity team requires a certain amount of training, regardless of gender. Moreover, since there was no difference in training between males and females, training should not act as a confounding variable on any differences found for eating measures between male and female athletes.



In her examination of elite (i.e., National team) female athletes, Sundgot-Borgen (1994b) reported a similar training volume to that found in the present study, of 15 hours per week. However, there may have been differences in how training was assessed between this study and Sundgot-Borgen's, so caution should be used when comparing results. Unfortunately, other studies examining eating attitudes and behaviours of athletes do not typically report training or physical activity patterns of athletes, making comparisons difficult.

### **Eating Attitudes and Behaviours Among Male and Female Athletes**

It was hypothesized that eating disorders (classified by the Q-EDD) would be more prevalent in female athletes, and that female athletes would engage in more disordered eating attitudes and behaviours (measured by the EDI and Q-EDD), including restrained eating (measured by the DEBQ-R), than male athletes.

There were significant differences found between male and female athletes on the EDI, specifically, the Body Dissatisfaction and Perfectionism subscales, providing some support for the original hypothesis. However, while females were more dissatisfied with certain parts of their bodies than males, males scored higher on the Perfectionism subscale than females. Although there were significant differences found, the mean EDI subscale scores indicated that both male and female athletes in this study were within a "normative" range (Garner, 1991).

These findings contradict previous research suggesting that female athletes exhibit more disordered eating attitudes and behaviours than male athletes. For example, Johnson et al., (1999) found that female NCAA athletes scored significantly higher than male NCAA athletes on three EDI subscales (Drive for Thinness, Bulimia and Body





Dissatisfaction). However, Johnson et al. examined NCAA athletes from a wide variety of schools, while this study only examined athletes at one school. Also, Sykora et al. (1993) found that female athletes displayed more disordered eating behaviours than male athletes, although they did not use the EDI to assess eating attitudes and behaviours (a questionnaire was developed de novo, along with the Eating Attitudes Test). Thus, caution should be used when comparing the results.

With regards to body dissatisfaction, given the current emphasis of thinness in our society and the unattainably thin ideal female body (Wiseman, Gray, Mosimann & Ahrens, 1992), many women may feel a sense of body dissatisfaction, if they cannot meet the 'thin ideal' (Pliner, Chaiken, & Flett, 1990). In addition, females in general tend to be more dissatisfied with their bodies than males (Bezner, Adams, & Steinhardt, 1997). Since they exist within this larger cultural context, female athletes are not necessarily protected from the cultural standard of thinness. Therefore, it is not surprising that female athletes felt more dissatisfied with their bodies than male athletes, since this difference is seen among men and women in general. However, as stated previously, it is important to note that female athletes scored in a normative range on the Body Dissatisfaction subscale.

It was surprising that male athletes scored higher on the Perfectionism subscale of the EDI than female athletes. Cultural norms might play a role in this finding, as sport has been traditionally dominated by men within Western society (Dworkin & Messner, 1999). Therefore, males may feel more pressure than females to excel in an area that has been typically dominated by men. However, this speculation requires more research.





Additionally, it is important to note again that both male and female athletes scored within the normative range on the Perfectionism subscale.

Contrary to the hypothesis, female and male athletes did not significantly differ on restrained eating. Restrained eating can be described as “the intention to restrict food intake” (Tuschl, 1990, p.105), and a high, or clinical, degree of restrained eating (e.g.,  $M = 3.71$ ,  $SD = .63$ ; Wardle, 1987) has been associated with anorexia, bulimia and binge eating (Wardle). The results in this study showed that both males ( $M = 2.00$ ,  $SD = .88$ ) and females ( $M = 2.25$ ,  $SD = .82$ ) engaged in a relatively low degree of restrained eating, when compared to individuals with clinical eating problems. Unfortunately, there is little research examining restrained eating behaviour in athletes, and when restrained eating is examined, it is assessed differently (e.g., Wilkins et al., 1991) or mean scores are not reported (e.g., Berry & Howe, 2000) making comparisons difficult.

Higher degrees of restrained eating are often seen in individuals who are trying to control or prevent weight gain, by restricting (or trying to restrict) food intake (Wardle, 1987). Wrestlers, for example, have been shown to restrict food intake in attempts to make weight for competition (Enns et al., 1987; Steen & Brownell, 1990). Wrestlers were the only group of athletes in this study who must adhere to weight restrictions in order to compete. However, because of the small number of wrestlers, no analysis was conducted between wrestlers and other athletes. As a group both male and female athletes scored relatively low on restrained eating, indicating that neither group is likely trying to control or prevent weight gain through food restriction. Athletes of either gender trying to control or prevent weight gain may not choose to engage in restrained eating practices, as this may have a detrimental affect on their athletic performance.



There were no significant differences for binge eating, operationalized as “eating in a discrete period of time (e.g., within any two hour period) an amount of food that is definitely larger than most people would eat during a similar period,” between male and female athletes. Specifically, 16% (N = 16) of the female athletes and 26.6% (N = 17) of the male athletes reported a binge episode. This finding is similar to a recent study, which found no significant differences between male (12.5%) and female (16.1%) NCAA athletes on episodes of binge eating (Johnson, Powers, & Dick, 1999). However, once the full clinical criteria of binge eating was met (i.e., feeling out of control during the binge episode), a significant difference between female and male athletes was found, with 56.3% (N = 9/16) of females feeling out of control during the binge episode compared to 11.1% (N = 2/17) of males. This finding is also similar to previous research, which has found that female athletes tend to engage in more clinical binge eating (i.e., feeling out of control during the binge episode) than men (Johnson et al.; Sykora, Grilo, Wilfley & Brownell, 1993). However, the rates reported in this study for clinical binge eating are lower than those reported by Johnson, Powers and Dick, who found that 81% of female athletes and 45% of male athletes who engaged in binge eating felt out of control during the episode. The present study only assessed athletes at one Canadian university, whereas Johnson et al. assessed athletes from 11 universities within the United States, so some caution should be used when comparing the results.

There were relatively low prevalence rates found for all other pathogenic behaviours listed in Table 8. These low rates are similar to those found in male and female NCAA athletes, with the exception of vomiting, which was higher (6.41% compared to 2% here) in the female NCAA athletes (Johnson et al., 1999) than in this



sample of female athletes. Fasting and strict dieting behaviour, which were not measured in the NCAA study, were reported by 15.6% (each) of male athletes in this study. Black and Burckes–Miller (1988) reported a lower prevalence rate for fasting (8.6%) than this study, but a higher rate for strict dieting (21.4%) than this study did, in their sample of male athletes. However, in the present study these behaviours were mostly engaged in by wrestlers, likely in an attempt to “make weight” for competition (Steen & Brownell, 1990).

Three percent of female athletes and 4.6% of male athletes in this study were classified by the Q-EDD as meeting clinical DSM-IV criteria for an eating disorder, a non-significant difference. Specifically, two females were classified with Bulimia Nervosa (purging type) and one with Exercise Bulimia. Two male athletes were classified with NonBingeing Bulimia (EDNOS), and one with Bulimia Nervosa (purging type). The APA (1994) suggest prevalence rates for Bulimia Nervosa to be between 1% and 3% for females. Thus, the prevalence of Bulimia Nervosa for female athletes in this study would not indicate that the female athletes are at any higher risk than females in general, when using the APA’s guidelines. The APA also suggest that the rates of eating disorders for males are about one tenth of that of females, so the male athletes in this study may be considered to be at higher risk for eating disorders when compared to the APA guidelines for males in general.

The prevalence rates found in this study are higher than the recent NCAA study, which found that 1.1% of females and no males met clinical criteria for an eating disorder (Johnson et al., 1999). One reason why the rates in this study may be higher than the rates found by Johnson et al. is the way in which athletes were classified. The present study





used a questionnaire (i.e., Q-EDD) designed specifically to classify individuals according to current DSM-IV criteria, while Johnson et al. relied heavily on cut-off scores on two EDI subscales (DT and BD). First, Garner et al. (1983) warns that EDI scores are not to be used for diagnostic purposes or to determine if individuals are “at risk” for an eating disorder. Second, Johnson et al. only used a total of three of the eight EDI subscales in the study, which Garner (1991) strongly warns against, as reliability and validity may be compromised. In addition, the present study also used different sampling procedures, and again only measured athletes at one university. Thus, because of potential problems classifying athletes in the Johnson et al. study, and because of sampling differences, caution should be used when comparing results between the two studies. The prevalence rates in the present study are also lower than other research, that has reported rates as high as 14.3% for male athletes and 39.2% (using *DSM-III* criteria) for female athletes (Burckes-Miller & Black, 1988).

In the present study all three male athletes classified with an eating disorder were from the wrestling team, while the female athletes were from three different sport teams (field hockey, ice hockey and volleyball). This may lend support to the idea that female athletes *in general* are more likely to be symptomatic for eating disorders compared to male athletes in general, but perhaps not compared to male wrestlers. Extreme caution should be used in making such an interpretation, as only three female athletes from three sports were classified as eating disordered from one university. However, the psychopathology exhibited by the wrestlers in the present study might be more of a reflection of the actual wrestling environment or requirements. Research examining eating psychopathology in wrestlers suggests that wrestlers may be more likely to be





symptomatic for eating disorders (Theil et al., 1993). Other researchers have argued that when research moves beyond behaviours to psychopathology, wrestlers are not “eating disordered” per se, but rather engage in disordered eating behaviours (Dale & Landers, 1998). The results of this study may lend support to the argument that wrestlers not only engage in disordered eating or pathogenic behaviours, but also exhibit the “psychopathology” necessary to be classified as symptomatic for a clinical eating disorder, as they were classified according to clinical DSM-IV criteria.

Garner, Rosen and Barry (1998) suggest that researchers go beyond identifying individuals who meet clinical criteria for an eating disorder, and carefully examine those who may be engaging in a spectrum of attitudes and behaviours. Therefore, to help eliminate any potential bias of the athletes classified as symptomatic for eating disorders, the six athletes who were classified by the Q-EDD as symptomatic for an eating disorder were removed from the analysis, and the EDI and DEBQ-R were subsequently re-examined. The analyses showed no changes in the previously reported relationships for the EDI, but there was a change for the DEBQ-R, providing some support for the original hypothesis. Specifically, female athletes were shown to engage in a significantly higher degree of restrained eating than male athletes. This change in the relationship appears to support the removal of the athletes with potential clinical problems. It also supports previous research that demonstrates restrained eaters are more likely to binge eat (Wardle, 1987), as female athletes who engaged in a higher degree of restrained eating were also shown to binge eat significantly more than males in this study. However, it is important to note that in general both male ( $M = 1.90$ ,  $SD = .77$ ) and female ( $M = 2.19$ ,  $SD = .76$ ) athletes were not engaging in a high degree of restrained eating, when



compared to individuals with clinically significant problems (e.g.,  $M = 3.71$ ,  $SD = .63$ ; Wardle) and when compared to previously published data for a general Canadian university population ( $M = 2.64$ ,  $SD = 1.00$ ; McLaren, Gauvin & White, 2001).

The hypothesis exploring differences between male and female athletes was further examined by comparing males and females within their own sport domains (basketball, ice hockey, soccer and volleyball) on the EDI and DEBQ-R. The only difference found was between male and female basketball athletes on the DEBQ-R. However, caution should be used to interpret these results, since the sample size was quite small (i.e.,  $N = 14$  females and  $N = 7$  males). Also, it is important to note that both the male ( $M = 1.48$ ,  $SD = .76$ ) and female ( $M = 2.59$ ,  $SD = .91$ ) basketball athletes scored quite low on this measure. Thus, it may not be that female basketball athletes are engaging in a particularly high degree of restrained eating, but rather that the males are engaging in a very low degree of restrained eating. This may be because male basketball players are not concerned about their weight being too high, but rather that their weight is too low. That is, they are interested in “bulking up” and adding weight, not losing weight or restricting their caloric intake. Many male athletes, including basketball players, commented after completing the DEBQ-R that they try to do “the exact opposite” (of items on the DEBQ-R) and eat constantly so they can gain weight.

### **Summary of Eating Attitudes and Behaviours Among Athletes**

Some support for the first hypothesis, that females would exhibit more disordered eating attitudes and behaviours, including restrained eating, than males was found. There were significant differences found on the EDI between male and female athletes, with females being more dissatisfied with their bodies compared to males. While there were



no differences in binge eating between male and female athletes, significantly more female athletes felt out of control during the binge episode, which is a critical component of clinical binge eating. In addition, after removing athletes classified as eating disordered by the Q-EDD, females engaged in a higher degree of restrained eating than males.

However, males also scored significantly higher than females on the Perfectionism subscale of the EDI, which was not expected. Also, there were no significant differences in pathogenic weight control behaviours, and there were no significant differences among the proportion of male and female athletes classified by the Q-EDD as symptomatic for an eating disorder. However, all male athletes classified as symptomatic for an eating disorder were from the wrestling team, whereas the females were all from different teams. This may speak more to the actual wrestling environment, than to male athletes per se. Additionally, given that only 50% of the female wrestlers and 65% of the male wrestlers from the wrestling team participated in this study, the results found in this study might be a conservative estimate of the problem in wrestling.

It is important to note that although there were differences between male and female athletes on the EDI, both groups scored within a normative range on all the EDI subscales (Garner, 1991). Similarly, although there were differences on the DEBQ-R, both male and female athletes were well below a clinically high degree of restrained eating. These findings are inconsistent with previous research that has shown females display more disordered eating attitudes and behaviours than males (Sykora et al., 1993), and reports that female athletes are an “at risk” group for eating disorders (Hausenblas & Carron, 1999; Petrie, 1993; Sundgot-Borgen, 1994a).





## **Eating Attitudes and Behaviours Among Athletes and Controls**

It was hypothesized that eating disorders would be more prevalent in female and male athletes, and that athletes would engage in more disordered eating attitudes and behaviours (measured by the EDI and Q-EDD), including restrained eating (measured by DEBQ-R), than their female and male control counterparts.

There were significant differences found on the EDI between both female and male athletes and controls on the Body Dissatisfaction subscale, and between female athletes and controls on the Drive for Thinness, Interceptive Awareness, and Ineffectiveness subscales. Contrary to the hypothesis, both the female and male controls scored higher on the EDI subscales, indicating more disordered eating attitudes and behaviours than the athlete group. Thus, the female and male controls were more dissatisfied with the size and shape of their bodies than their athlete counterparts. Female controls were more concerned with dieting and had a higher fear of gaining weight, displayed more confusion in recognizing and responding to their emotional states, and felt more worthless and inadequate compared to the female athletes. However, both the athletes and controls mean subscale scores for the EDI were within a normative range for university students (Garner, 1991).

These findings are contrary to the hypothesis, and contradict some previous research which has found athletes to be an “at risk” group for eating disorders (e.g., Petrie, 1993, Sundgot-Borgen, 1994b; Theil et al., 1993). Given that both male and female controls had more body fat than male and female athletes, it is not necessarily surprising that they reported a greater sense of body dissatisfaction. There is also research that supports the finding of this study. For example, previous research has demonstrated





that when compared to athletes, controls are more dissatisfied with their bodies (Warren et al., 1990; Wilkins et al., 1991). Petrie (1996) also found that female controls experienced a greater sense of Ineffectiveness and Body Dissatisfaction than female athletes although Petrie found no differences on the other EDI subscales. Wilkins et al. concluded that male and female athletes exhibited lower levels of eating pathology when compared to controls.

For restrained eating behaviour, there was a significant difference found between female athletes and controls. However, contrary to the hypothesis, female controls ( $M = 2.76$ ,  $SD = .81$ ) were engaging in a significantly higher degree of restrained eating compared to female athletes ( $M = 2.25$ ,  $SD = .82$ ), although neither group demonstrated a high or clinical (e.g.,  $M = 3.71$ ,  $SD = .63$ ; Wardle, 1987) degree of restraint. There were no significant differences for restrained eating between male athletes and controls.

There is little research comparing restrained eating in athletes and controls, and a previous study found no significant differences between the two groups (Wilkins et al., 1991). Unfortunately, a different measure of restraint was used in the Wilkins et al. study, so a direct comparison is difficult. However, given that the female controls were more dissatisfied with their bodies than athletes, as demonstrated by the EDI, it might not be surprising that they are also engaging in a higher degree of restrained eating, as they may be trying to prevent weight gain or promote weight loss through dietary restraint.

There were no significant differences found between male athletes and controls, and female athletes and controls for pathogenic weight control behaviours listed in Table 8. Episodes of binge eating were reported by 26.6% ( $N = 17$ ) of the male athletes and 27% ( $N = 10$ ) of the male controls. Feeling out of control during the episode of binge



eating was reported by 11.1% (N = 2/17) of the male athletes and 10% (N = 1/10) of the male controls. Episodes of binge eating were reported by 16% (N = 16) of the female athletes and 16.8% (N = 16) of the female controls. Feeling out of control during the episode of binge eating was reported by 56.3% (N = 9/16) of the female athletes and 62.5% (N = 10/16) of the female controls. This is important as a lack of control while binge eating is a critical component of binge eating behaviour. The results of this study may suggest that binge eating is problematic for females in general. There were relatively low prevalence rates reported for all pathogenic behaviours listed in Table 8.

These results are similar to those of O'Connor et al. (1995) who also found no significant differences between athletes and controls on frequency of pathogenic weight control behaviours. In addition, O'Conner et al. also found relatively low prevalence of pathogenic weight control behaviours, with the exception of binge eating, which was reported by 30% of athletes and 43% of controls. However, O'Connor et al. had a small sample size (N = 44), only examined females, and only examined one sport (i.e., gymnastics).

Overall, there were relatively low prevalence rates reported between both male athletes and controls, and female athletes and controls for all pathogenic behaviours in this study. However, as mentioned earlier, there were small cell numbers for many of the behaviours, so analyses could not be conducted for all pathogenic behaviours. Therefore, one should use caution in interpreting the results. A larger sample size might help to clarify if differences exist.

There were a significantly greater proportion of female controls (12.6%; N = 12) than female athletes (3%; N = 3) classified as symptomatic for an eating disorder



(Bulimia Nervosa or EDNOS), by the Q-EDD. Unfortunately, few studies have actually compared differences between an athlete and control group on specific DSM-IV eating disorder symptomatology. That is, most studies only use measures of eating disorder symptomatology (e.g., EDI) to compare athletes and controls, or do not employ a control group. Previous research examining eating disorders in female college students have reported prevalence rates between 5.1% (Heatherton, Nichols, Mahamedi & Keel, 1995) and 11.1% (Coric & Murstein, 1993) for Bulimia Nervosa. The prevalence rates found in this study (12.6%) are slightly above this range, which may suggest that the control group was not representative of female college students. It may be that the sample was biased, as the controls were largely recruited from health related classes. Potential differences between male athletes and controls were not calculated because no male controls were classified as symptomatic for an eating disorder, which created statistical limitations. However, one may still speculate that perhaps certain sport environments, such as those with weight criterions, place some male athletes at risk for eating disorder symptoms, when compared to male controls. This supports some of the research examining male wrestlers (Theil et al., 1993).

It was surprising to find that more female controls were classified with eating disorder symptoms compared to female athletes. There are several reasons why this may have occurred. First, it may be that athletes (except perhaps wrestlers) examined at the University of Alberta simply are not “at risk” for an eating disorder when compared to controls. Previous researchers have argued that sport may actually “protect” athletes from eating disorders (Wilkins et al., 1991). Second, it may be that the sample was biased. That is, female athletes who had eating problems chose not to participate in the study, or





did not report honestly on questionnaires. Although measures were taken to ensure confidentiality and anonymity, previous research has shown that athletes in general tend to under report the frequency of problematic eating attitudes and behaviours (Sundgot-Borgen, 1994b). Although the same bias could apply to the control group, the athletes may have felt that reporting eating problems could jeopardize their role on the team, or tarnish sport in general. While completing the questionnaires, athletes (especially females) were very cognizant of the questions asked, and would often comment on whether or not responding in a certain fashion would implicate them in a negative way. Additionally, as mentioned previously 39% of available athletes chose not to participate in the study. While it is difficult to speculate about the athletes who did not participate in the study, as no information is known about them, the prevalence rates of eating disorders found in this study for athletes may be conservative.

As done previously, athletes and controls that were classified as symptomatic for an eating disorder were removed from analysis, and the EDI and DEBQ-R were reanalyzed between the female athletes and controls and the male athletes and controls.

Previously between female athlete and controls, significant differences were found for the EDI on four subscales. However, after women who were classified with eating disorders were removed, there were no differences on the Ineffectiveness subscale. There were no changes in previously reported relationships for the other subscales. That is, female controls scored significantly higher on three subscales: Body Dissatisfaction, Drive for Thinness, and Interoceptive Awareness. There was no change in the previously reported relationship for restrained eating, with female controls exhibiting a higher degree of restrained eating than the female athletes. This might indicate that even when





individuals with potentially clinically significant problems are removed, controls were still exhibiting more disordered eating attitudes and behaviours, including restrained eating, than athletes, although both groups were still scoring within a normative range.

Previously between male athletes and controls, significant differences were found for only one EDI subscale, Body Dissatisfaction. However, after removing the three men (i.e., wrestlers) classified as symptomatic for an eating disorder, differences were found for three EDI subscales: Body Dissatisfaction, Ineffectiveness and Interoceptive Awareness, with male controls scoring significantly higher on each of the subscales. No differences in restrained eating behaviour among male athletes and controls were found. This may indicate that the three wrestlers classified as symptomatic for an eating disorder were biasing the sample. When individuals with potentially clinically significant problems were removed, male controls were found to exhibit more disordered eating attitudes and behaviours, as measured by the EDI, than male athletes. Petrie (1996) also found that male controls scored higher on the Body Dissatisfaction and Ineffectiveness subscales of the EDI compared to male athletes. Similarly, Wilkins et al. (1991) found that male controls score higher on measures of disordered eating compared to male athletes.

### **Summary of Eating Attitudes and Behaviours Between Athletes and Controls**

There was no support found for the second hypothesis, that athletes would exhibit more disordered eating attitudes and behaviours, including restrained eating, compared to controls. The prevalence of eating disorders was higher in female controls than athletes. Both male and female controls reported more eating disordered attitudes and behaviours, as measured by the EDI (specifically Body Dissatisfaction, Drive for Thinness,



Ineffectiveness and Interoceptive Awareness). Additionally, female controls engaged in a higher degree of restrained eating compared to female athletes. There were no differences found for restrained eating among males. The rates of pathogenic weight control behaviours were similar for athletes and controls, with relatively low rates reported for these behaviours.

These findings contradict some previous research (e.g., Petrie, 1993; Sundgot-Borgen, 1994b), including a recent meta-analysis (Hausenblas & Carron, 1999), that has placed athletes “at risk” for eating disorders. However, much of the previous research that has found athletes to be at risk for eating disorders has not used a control group. Rather, many researchers have used previously published norms of college students for comparison, or simply rely on high cut off scores on measures (such as the EDI) to place athletes in an “at risk” group (e.g., Johnson et al., 1999).

In several studies that have employed a control group, no significant differences were found between athletes and controls. For example, Wilkens et al. (1991) found no differences in eating attitudes and behaviours between athletes and controls, as did Hausenblas and Mack (1999). Similarly, O’Conner et al. (1994), found no differences between gymnasts and controls in eating attitudes and behaviours. Thus, although support was not found for the second hypotheses, the results of this study do support some research that has found when compared to controls, athletes do not exhibit more disordered eating attitudes and behaviours.



## **VI. CONCLUSIONS**

### **Summary and Conclusions**

The purpose of this study was to examine the prevalence of eating disorders, and the eating attitudes and behaviours of male and female athletes, to try to determine if CIAU athletes at the University of Alberta are an “at risk” group for eating disorders. Male and female athletes were compared to each other on measures of eating attitudes and behaviours, including restrained eating, and the athlete group was also compared to a control group of undergraduate students from the University of Alberta.

This study was important for several reasons. First, there has been no study examining prevalence rates of eating disorders across a variety of sport domains in CIAU athletes. Additionally, there have been few studies that examine eating attitudes and behaviours in Canadian athletes. Second, most studies that have examined eating attitudes and behaviours in athletes focus on one sport domain, such as wrestling or gymnastics, and often exclude male athletes. Third, the literature is plagued with methodological issues, such as using subscale scores from questionnaires (e.g., EDI) to determine prevalence rates of eating disorders (e.g., Johnson et al, 1999), something which Garner (1991) warns against. Lastly, the literature examining eating attitudes, behaviours and eating disorders in athletes is equivocal in its results. Some studies have found athletes to be an at risk group for eating disorders, while other have found that athletes are within a “normative range” on measures of eating attitudes and behaviours.

Therefore, this study sought to rectify some of these problems by examining both male and female Canadian athletes from a wide variety of sport domains. In addition, this study used complete (i.e., not only one or two subscales from the EDI) standardized measures to assess eating attitudes and behaviours and restrained eating. The prevalence



rates of eating disorders were determined by a questionnaire designed specifically to assess and operationalize individuals to current *DSM-IV* criteria.

One hundred and sixty five CIAU athletes (101 females and 64 males) and 132 controls (95 females and 37 males) from the University of Alberta participated in this study. Participants were asked to come at a predetermined time to a classroom setting at the University to complete all measures. It was hypothesized that the female athletes would exhibit more disordered eating attitudes and behaviours, including restrained eating, than the male athletes, and also that the male and female athletes would exhibit more disordered eating attitudes and behaviours, including restrained eating, than their respective genders control group.

Results showed that 3% of female athletes and 4.6% of male athletes were classified with eating disorders in accordance with *DSM-IV* criterion by the Q-EDD. This was a non significant difference. However, all male athletes classified with an eating disorder were wrestlers, while the females were from three different sports. It may be that male athletes in general not are at increased risk for an eating disorder, but rather that male wrestlers, due to the requirements of the sport, may be at increased risk for an eating disorder.

There were no differences between male and female athletes on episodes of binge eating. However, more female athletes reported feeling out of control during the binge episode than male athletes, which is a critical component of clinically defined binge eating behaviour. In addition, female athletes scored higher on the Body Dissatisfaction subscale of the EDI than male athletes and engaged in a higher degree of restrained eating than male athletes, once individuals with potential clinical eating problems were





removed from analysis. Therefore, there appears to be some support for the first hypothesis.

However, male athletes scored higher than female athletes on the Perfectionism subscale of the EDI, which was not expected. It is important to note that for the EDI and DEBQ-R (restrained eating) both male and female athletes scores were well within previously published normative ranges, indicating that the athletes are not exhibiting a high degree of symptomatology associated with clinical eating problems

There was a significantly greater proportion of female controls (12.6%) than female athletes (3%) classified as symptomatic for an eating disorder by the Q-EDD. In addition, there were significant differences found among the two groups for eating attitudes and behaviours (EDI) and restrained eating (DEBQ-R), with female controls exhibiting more disordered eating attitudes and behaviours, and engaging in a higher degree of restrained eating than female athletes. There were no significant differences between the female athletes and controls for pathogenic weight control behaviours.

There were significant differences found between male athletes and controls on the EDI, with male controls exhibiting a higher degree of disordered eating attitudes and behaviours than male athletes. There were no male controls classified as symptomatic for an eating disorder by the Q-EDD, so no analyses was conducted between male athletes and male controls for the Q-EDD. There were no differences between male athletes and controls for restrained eating, or for pathogenic weight control behaviours.

Once again, it is important to note that for both the EDI and DEBQ-R, both the athlete and control group were within a “normative range” indicating that although there are differences between the two groups, both are exhibiting relatively “normal” eating



attitudes and behaviours. However, the results of this study did not support the second hypothesis, that athletes would exhibit more disordered eating attitudes and behaviours than controls, and also some previous research that has found athletes to be an “at risk” group for eating disorders. It may be that this sample of athletes is simply not “at risk” for eating disorders. There is previous research which also demonstrates that athletes do not appear to be at risk for eating disorders, or engaging in high degrees of disordered eating behaviour (Petrie, 1996; Wilkins et al., 1991). Wilkins et al. have speculated that being involved in sport might actually protect athletes from eating disorders.

Another possibility is that athletes who knowingly had problematic eating behaviours chose not to take part in the study, or did not answer questionnaires honestly. It can not be ignored that 39% of potential athletes chose not to participate in the study. While it is difficult to speculate about the non-responders, the prevalence rates found in this study might be a conservative estimate of eating disorders, and disordered eating attitudes and behaviours in the athletes. Moreover, previous research has shown that athletes tend to deny or under report problematic eating behaviours in survey research (Sundgot-Borgen, 1994b; Wilmore, 1991). Although measures were taken to ensure confidentiality, anonymity, and coaches were never present during testing, some athletes still may have felt that revealing problematic eating behaviours might jeopardize their role on the team.

The differences between the athlete and control group might also be a function of the control group. The controls were a convenient sample, and largely selected from health related courses, which may have biased the results. Perhaps students who had eating problems wanted to know what their body composition was, and thus participated



in the study. They may have been more apt to answer honestly on the questionnaires, as there may have been less of an issue around confidentiality, for example someone such as a coach finding out they had eating problems. Beglin and Fairburn (1992) comment that estimates of prevalence of eating disorders in any population are likely to be conservative or underestimates, as women who have eating problems have been shown not to participate in studies examining eating disorders. The findings of this study may suggest that eating attitudes and behaviours may be problematic in the general university population, and perhaps this population should be more heavily targeted for eating disorder prevention and intervention.

### **Recommendations**

This study only examined CIAU athletes at the University of Alberta. It may be that athletes at the University of Alberta are dissimilar to other groups of Canadian varsity athletes. Therefore, future research needs to be conducted across the greater CIAU to help ascertain a more accurate description of Canadian varsity athletes.

Future research should also include control groups of students from the same university as the athletes. Many studies have not used a control group of individuals for comparison. This may be important as athletes in general might not be exhibiting more disordered eating attitudes and behaviours when they are compared to a control group from the same environment (e.g., school).

In addition, few studies examine athletes from a wide variety of sport domains. Thus, it may not be that athletes per se are at increased risk for eating disorders, but rather that athletes within certain sport environments are at risk for an eating disorder. However even this speculation must be closely examined, as some research has shown that while certain athletes in certain sport domains engage in pathogenic weight control behaviours, they do not



exhibit the psychological characteristic of individuals of eating disorders, such as a genuine fear of fat. Future research should therefore closely examine athletes from a variety of sport domains, and use measures that assess not only behaviours, but also psychological characteristics

This is the first study to use the Q-EDD to classify individuals within sport as symptomatic for eating disorders. The Q-EDD is easy to administer and only takes approximately 5 minutes to complete. Some individuals (mostly athletes) did find answering one question “Do you exercise a lot?” problematic, as they were not sure what “a lot” was. Future research should closely examine the use of this measure in athletes, and consider using the Q-EDD to help determine if athletes are in fact at increased risk for eating disorders.

The research examining eating attitudes and behaviours of athletes is plagued with methodological problems, and equivocal results. Future research needs to examine large groups of male and female athletes, and use standardized measures to assess eating attitudes and behaviours, in order to help determine if athletes are in fact an at risk group for eating disorders. Athletes must always be ensured of confidentiality to help promote participation and honesty in research studies examining eating attitudes and behaviours. Response rates might be strengthened if highly valued and respected players, such as team captains, met prior to the data collection with the researcher to discuss the importance of the study, and issues of confidentiality. The team captain then may be better able than the researcher to garner support for the study from all team members.





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## APPENDIX A

### Consent Form

Title of Project: **Eating Attitudes and Behaviors of Competitive Athletes.**

**Principal Investigator:** Ms. Terra Murray, Graduate Student  
Faculty of Physical Education and Recreation  
University of Alberta, Edmonton, AB  
(780) 492-8739

**Co-Investigators:**

Dr. Dru Marshall, Professor  
Faculty of Physical Education  
and Recreation  
University of Alberta  
(780) 492- 1035

Dr. Vicki Harber, Professor  
Faculty of Physical Education  
and Recreation  
University of Alberta  
(780) 492-1023

Dr. Linda McCargar, Assoc. Prof.  
Department of Agricultural,  
Food and Nutritional Science  
University of Alberta  
(780) 492-9287

**Please Complete:**

Do you understand that you have been asked to be in a research study? Yes No

Have you received and read a copy of the attached information sheet? Yes No

Do you understand the benefits and risks involved in taking part in this research study? Yes No

Have you had an opportunity to ask questions and discuss this study? Yes No

Do you understand that you are free to refuse to participate, or withdraw from the study at any time, without consequence, and that your information will be withdrawn at your request? Yes No

Has the issue of confidentiality been explained to you? Yes No

Do you understand who will have access to your information? Yes No

Do you give permission for the investigator(s) to contact you for the purpose of follow-up clarification of your written responses if the investigator(s) so desires? Yes No

This study was explained to me by: \_\_\_\_\_

I agree to take part in this study.

\_\_\_\_\_  
Signature of Research Participant

\_\_\_\_\_  
Date

\_\_\_\_\_  
Witness

\_\_\_\_\_  
Printed Name

\_\_\_\_\_  
Printed Name

I believe that the person signing this form understands what is involved in the study and voluntarily agrees to participate.

\_\_\_\_\_  
Signature of Investigator or Designee

\_\_\_\_\_  
Date



## APPENDIX B

### Coach Information Letter

Title: Eating Attitudes and Behaviors of Competitive Athletes

**Principal Investigator:** Ms. Terra Murray

Faculty of Physical Education and Recreation  
University of Alberta  
(780) 492-8739

**Co-Investigators:**

Dr. Dru Marshall

Faculty of Physical Education  
and Recreation

University of Alberta

(780) 492- 1035

Dr. Vicki Harber

Faculty of Physical Education  
and Recreation

University of Alberta

(780) 492-1023

Dr. Linda McCargar

Department of Agricultural,  
Food and Nutritional Science

University of Alberta

(780) 492-9287

Dear Coach,

My name is Terra Murray and I am a graduate student in the Faculty of Physical Education and Recreation. This letter is to inform you about a study we will be conducting at the University of Alberta examining the eating attitudes and behaviors of CIAU athletes. Specifically, we want to know if eating attitudes and behaviors vary from sport to sport, between men and women, and between athletes and controls. Therefore, we are asking coaches of all CIAU sport domains at the University of Alberta for their team's permission to participate. Eventually, we hope to examine all CIAU athletes within Canada, as there have been relatively few large scale studies conducted in this area, and currently there is no comparative Canadian data. Also, most previous studies only examine one or two sport domains, and do not include male athletes. Therefore, this study may make a significant contribution, as we intend to examine a variety of sport domains, including those comprising male athletes.

While this study may not be of direct benefit to your team, we believe that the results from these types of studies help to increase awareness of athlete health, and therefore may improve the health care of athletes.

The athlete involvement in this study will require that they complete a general survey and three questionnaires. Their height, weight and 5 skinfold measures also will be taken. If you should chose to allow your team to participate, we would then establish a time to explain the study to the athletes, and participants will be sought. At a time convenient for your team, we will ask athletes to complete questionnaires and height, weight and skinfold measures will be taken. The questionnaires will be completed at a predetermined time in a classroom setting with other team members. While the athlete group is completing questionnaires, athletes will be called into a private area one at a time to have their height, weight and skinfold measures taken. The questionnaires and height, weight and skinfold measures will be taken once, and should take less than 1 hour to complete. The athletes may ask any questions of the investigator at any point during their participation. As a coach, we ask that you are not present at this time to ensure confidentiality to the athletes.

The athlete's participation and individual results will be kept in complete confidence by the principal investigator. As a coach, you will not have access or knowledge of any athlete's individual responses. Although Dr. Marshall is listed as co-investigator she is also a coach, and therefore she also will not have access to any athlete's individual responses. To ensure confidentiality, the results will be coded and stored in a locked cabinet to which only the principal investigator will have access, and will be entered into a limited access computer file. Normally, information is retained for a period of five years post publication, after which it will be destroyed.

Given the instrumentation used to collect the data in this study (i.e., questionnaires), the risks associated with athlete participation revolve around the disclosure of confidential information. If the athlete desires, their questionnaire results will be mailed to them, along with previously published normative data.





Within the next week, I will be contacting you personally to discuss the potential for you team to participate, and will be able to answer any questions or concerns you might have. You also may contact any of the other investigators listed above. If you would like to speak with someone who is not involved with this study, please call Dr. Debra Shogan, Associate Dean (Research and Graduate Studies), Faculty of Physical Education and Recreation, University of Alberta, at (780) 492-5910.

Thank you for you time and attention.

Sincerely,

Terra Murray



## APPENDIX C

### Participant Information Letter

Title: Eating Attitudes and Behaviors of Competitive Athletes

**Principal Investigator:** Ms. Terra Murray  
Faculty of Physical Education and Recreation  
University of Alberta  
(780) 492-8739

**Co-Investigators:**

Dr. Dru Marshall  
Faculty of Physical Education  
and Recreation  
University of Alberta  
(780) 492- 1035

Dr. Vicki Harber  
Faculty of Physical Education  
and Recreation  
University of Alberta  
(780) 492-1023

Dr. Linda McCargar  
Department of Agricultural,  
Food and Nutritional Science  
University of Alberta  
(780) 492-9287

Dear Athlete,

The purpose of this study is to learn more about the eating attitudes and behaviors of Canadian athletes. Specifically, we want to know if eating attitudes and behaviors vary from sport to sport, and between men and women.

While this study may not be of direct benefit to you, we believe that the results from these types of studies help to increase awareness of athlete health, and therefore may help improve the health care of athletes.

Your involvement in this study will require that you complete a general survey and three questionnaires. Your height, weight and 5 skinfold measures will also be taken. Height will be taken with a measuring tape and set square, while weight will be measured on a beam balance scale. Skinfolds will be measured with a skinfold caliper at five sites (front and back of the arm, underneath the shoulder blade, over the hip and on the inside of the calf). The questionnaires will be completed in a classroom setting with other team members. Your coach will not be present. While your group is completing the questionnaires, you will be taken to a private area to get your height, weight and skinfold measures taken. The questionnaires and height, weight and skinfold measures should take no longer than 1 hour to complete. You may ask any questions of the investigator at any point during your participation.

Your participation and individual results will be kept in complete confidence by the principal investigator. At no time will your coaches have access or knowledge of your individual responses. Your involvement in the study will in no way impact your selection for the team, or affect your role as an athlete on the team. To ensure confidentiality, the results will be coded and stored in a locked cabinet to which only the principal investigator will have access, and will be entered into a limited access computer file. Normally, information is retained for a period of five years post publication, after which it will be destroyed.

Given the instrumentation used to collect the data in this study (i.e., questionnaires), the risks associated with your participation revolve around the disclosure of confidential information. If you desire, your questionnaire results will be mailed to you, along with previously published normative data for comparison.

You may decline to continue or withdraw from the study at any time without consequence during the research process. In order to withdraw, all you must do is inform one of the investigators. Your information will also be withdrawn at your request.

If you have any concerns, feel free to contact any of the investigators listed above. If you would like to speak with someone who is not involved with this study, please call Dr. Debra Shogan, Associate Dean (Research and Graduate Studies), Faculty of Physical Education and Recreation, University of Alberta, at (780) 492-5910.

Please **read and sign** the following consent form to indicate your involvement.

Thank you for your time and attention.



## APPENDIX D

### Participant Information Letter (Control Group)

Title: Eating Attitudes and Behaviors of Competitive Athletes

**Principal Investigator:** Ms. Terra Murray  
Faculty of Physical Education and Recreation  
University of Alberta  
(780) 492-8739

**Co-Investigators:**

Dr. Dru Marshall  
Faculty of Physical Education  
and Recreation  
University of Alberta  
(780) 492- 1035

Dr. Vicki Harber  
Faculty of Physical Education  
and Recreation  
University of Alberta  
(780) 492-1023

Dr. Linda McCargar  
Department of Agricultural,  
Food and Nutritional Science  
University of Alberta  
(780) 492-9287

Dear Student,

The purpose of this study is to learn more about the eating attitudes and behaviors of Canadian athletes. Specifically, we want to know if eating attitudes and behaviors vary from sport to sport, and between women and men. We also want to know if there are differences in eating attitudes and behaviors between athletes and students in general at the University of Alberta.

While this study may not be of direct benefit to you, we believe that the results from these types of studies help to increase awareness of athlete and student health, and therefore may help improve the health care of students and athletes.

Your involvement in this study will require that you complete a general survey and three questionnaires. Your height, weight and 5 skinfold measures will also be taken. Height will be taken with a measuring tape and set square, while weight will be measured on a beam balance scale. Skinfolts will be measured with a skinfold caliper at five sites (front and back of the arm, underneath the shoulder blade, over the hip and on the inside of the calf). The questionnaires will be completed in a classroom setting with other participants. While others are completing the questionnaires, you will be taken to a private area to get your height, weight and skinfold measures taken. The questionnaires and height, weight and skinfold measures should take no longer than 1 hour to complete. You may ask any questions of the investigator at any point during your participation.

Your participation and individual results will be kept in complete confidence by the principal investigator. To ensure confidentiality, the results will be coded and stored in a locked cabinet to which only the principal investigator will have access, and will be entered into a limited access computer file. Normally, information is retained for a period of five years post publication, after which it will be destroyed.

Given the instrumentation used to collect the data in this study (i.e., questionnaires), the risks associated with your participation revolve around the disclosure of confidential information. If you desire, your questionnaire results will be mailed to you, along with previously published normative data for comparison.

You may decline to continue or withdraw from the study at any time without consequence during the research process. In order to withdraw, all you must do is inform one of the investigators. Your information will also be withdrawn at your request.

If you have any concerns, feel free to contact any of the investigators listed above. If you would like to speak with someone who is not involved with this study, please call Dr. Debra Shogan, Associate Dean (Research and Graduate Studies), Faculty of Physical Education and Recreation, University of Alberta, at (780) 492-5910.

Please **read and sign** the following consent form to indicate your involvement.

Thank you for your time and attention.



## APPENDIX E

### General Survey (athletes)

#### Demographic Information

- Name: \_\_\_\_\_
- Age: \_\_\_\_\_
- Sex: (please circle) Male Female
- School Status: (please circle)
  - 1<sup>st</sup> year
  - 2<sup>nd</sup> year
  - 3<sup>rd</sup> year
  - 4<sup>th</sup> year
  - 5<sup>th</sup> year or longer
- Race/Ethnicity: (please circle)
  - Caucasian/White African/Black Native Asian
  - Other: \_\_\_\_\_ (please specify)
- Present height: \_\_\_\_\_ (centimeters or feet & inches)
- Present weight: \_\_\_\_\_ (kgs. or lbs)

#### General Sport Questions

- What athletic team do you play for at the U of A?  
\_\_\_\_\_
- What position do you play? \_\_\_\_\_
- How many years have you been playing on the U of A team? \_\_\_\_\_
- How many years have you competed in this sport? \_\_\_\_\_
- Do you play any other competitive sports?

YES NO

If yes, please indicate other sports \_\_\_\_\_





### **Training and Exercise Questions**

Please complete the following to describe your physical activity profile.

#### **Circle Appropriate Response:**

- For my team training at U of A, I typically train 0 1 2 3 4 5 6 7 days/week.
- Outside of my team training, I workout/exercise 0 1 2 3 4 5 6 7 days/week.

Please list what activities you do outside of your normal team training (e.g., running, weightlifting etc.). \_\_\_\_\_

\_\_\_\_\_

- Approximately how much time do you spend, in an average week, working out and training (combine both time spent team training and personal workouts)?

\_\_\_\_\_



## APPENDIX F

### General Survey (controls)

#### Demographic Information

- Name: \_\_\_\_\_
- Age: \_\_\_\_\_
- Sex: (please circle) Male    Female
- School Status: (please circle)
  - 1<sup>st</sup> year
  - 2<sup>nd</sup> year
  - 3<sup>rd</sup> year
  - 4<sup>th</sup> year
  - 5<sup>th</sup> year or longer
- Race/Ethnicity: (please circle)
  - Caucasian/White                  African/Black                  Native                  Asian
  - Other: \_\_\_\_\_ (please specify)
- Present height: \_\_\_\_\_ (centimeters or feet & inches)
- Present weight: \_\_\_\_\_ (kgs. or lbs)



## APPENDIX G

### Eating Disorder Inventory

This is a scale which measures a variety of attitudes, feelings and behaviors. Some of the items relate to food and eating. Others ask you about your feelings about yourself. There are no right or wrong answers so try very hard to be completely honest in your answers. Read and answer each question carefully.

1. I eat sweets and carbohydrates without feeling nervous.

always      usually      often      sometimes      rarely      never

2. I think my stomach is too big.

always      usually      often      sometimes      rarely      never

3. I wish I could return to the security of childhood.

always      usually      often      sometimes      rarely      never

4. I eat when I am upset.

always      usually      often      sometimes      rarely      never

5. I stuff myself with food.

always      usually      often      sometimes      rarely      never

6. I wish I could be younger.

always      usually      often      sometimes      rarely      never

7. I think about dieting.

always      usually      often      sometimes      rarely      never

8. I get frightened when my feelings are too strong.

always      usually      often      sometimes      rarely      never

9. I think that my thighs are too large.

always      usually      often      sometimes      rarely      never



10. I feel ineffective as a person.

always usually often sometimes rarely never

11. I feel extremely guilty after overeating.

always usually often sometimes rarely never

12. I think that my stomach is just the right size.

always usually often sometimes rarely never

13. Only outstanding performance is good enough in my family.

always usually often sometimes rarely never

14. The happiest time in life is when you are child.

always usually often sometimes rarely never

15. I am open about my feelings.

always usually often sometimes rarely never

16. I am terrified of gaining weight.

always usually often sometimes rarely never

17. I trust others.

always usually often sometimes rarely never

18. I feel alone in the world.

always usually often sometimes rarely never

19. I feel satisfied with the shape of my body.

always usually often sometimes rarely never

20. I feel generally in control of things in my life.

always usually often sometimes rarely never





21. I get confused about what emotion I am feeling.

always usually often sometimes rarely never

22. I would rather be an adult than a child.

always usually often sometimes rarely never

23. I can communicate with others easily.

always usually often sometimes rarely never

24. I wish I were someone else.

always usually often sometimes rarely never

25. I exaggerate or magnify the importance of my weight.

always usually often sometimes rarely never

26. I can clearly identify what emotion I am feeling.

always usually often sometimes rarely never

27. I feel inadequate.

always usually often sometimes rarely never

28. I have gone on eating binges where I have felt that I could not stop.

always usually often sometimes rarely never

29. As a child, I tried very hard to avoid disappointing my parents and teachers.

always usually often sometimes rarely never

30. I have close relationships.

always usually often sometimes rarely never

31. I like the shape of my buttocks.

always usually often sometimes rarely never



32. I am preoccupied with the desire to be thinner.

always usually often sometimes rarely never

33. I don't know what's going on inside me.

always usually often sometimes rarely never

34. I have trouble expressing my emotions to others.

always usually often sometimes rarely never

35. The demands of adulthood are too great.

always usually often sometimes rarely never

36. I hate being less than the best at things.

always usually often sometimes rarely never

37. I feel secure about myself.

always usually often sometimes rarely never

38. I think about bingeing (overeating).

always usually often sometimes rarely never

39. I feel happy that I am not a child anymore.

always usually often sometimes rarely never

40. I get confused as to whether or not I am hungry.

always usually often sometimes rarely never

41. I have a low opinion of myself.

always usually often sometimes rarely never

42. I feel that I can achieve my standards.

always usually often sometimes rarely never



43. My parents have expected excellence of me.

always usually often sometimes rarely never

44. I worry that my feelings will get out of control.

always usually often sometimes rarely never

45. I think my hips are too big.

always usually often sometimes rarely never

46. I eat moderately in front of others and stuff myself when they're gone.

always usually often sometimes rarely never

47. I feel bloated after eating a small meal.

always usually often sometimes rarely never

48. I feel that people are happiest when they are children.

always usually often sometimes rarely never

49. If I gain a pound, I worry that I will keep gaining.

always usually often sometimes rarely never

50. I feel that I am a worthwhile person.

always usually often sometimes rarely never

51. When I am upset, I don't know if I am sad, angry or frightened.

always usually often sometimes rarely never

52. I feel that I must do things perfectly or not do them at all.

always usually often sometimes rarely never

53. I have the thought of trying to vomit in order to lose weight.

always usually often sometimes rarely never



54. I need to keep people at a certain distance (feel uncomfortable if someone tries to get too close).

always usually often sometimes rarely never

55. I think that my thighs are just the right size.

always usually often sometimes rarely never

56. I feel empty inside (emotionally).

always usually often sometimes rarely never

57. I can talk about my personal thoughts or feelings.

always usually often sometimes rarely never

58. The best years of your life are when you become an adult.

always usually often sometimes rarely never

59. I think my buttocks are too large.

always usually often sometimes rarely never

60. I have feelings I can't quite identify.

always usually often sometimes rarely never

61. I eat or drink in secrecy.

always usually often sometimes rarely never

62. I think that my hips are just the right size.

always usually often sometimes rarely never

63. I have extremely high goals.

always usually often sometimes rarely never

64. When I am upset, I worry that I will start eating.

always usually often sometimes rarely never





## APPENDIX H

### Q-EDD

Please complete the following questions as honestly as possible. The questions refer to current behaviors and beliefs, meaning those that have occurred in the past 3 months.

My body-frame is: small      medium      large  
(please circle)

I would like to weigh: \_\_\_\_\_ (kgs. or lbs.)

1. Do you experience recurrent episodes of binge eating, meaning eating in a discrete period of time (e.g., within any 2-hour period) an amount of food that is definitely larger than most people would eat during a similar time period.

YES    NO

**If yes:** Continue to answer the following questions.

**If no:** Skip to question #4.

2. Do you have a sense of lack of control during the binge eating episodes (i.e., the feeling that you cannot stop eating or control what or how much you are eating)?

YES    NO

3. Circle the answer within the two sets of [bold brackets] below that best fit for you:

On the average, I have had [1, 2, 3, 4, 5, 6 or more] binge eating episodes a WEEK for at least

[1 month, 2 months, 3 months, 4 months, 5 months, 6-12 months, more than one year]

4. Please circle the appropriate responses below concerning things you may do currently to prevent weight gain. If you circle yes to any question, please indicate how often on average you do this and how long you have been doing this.

- a). Do you make yourself vomit to prevent weight gain? YES    NO

How often do you do this?

Daily    Twice/Week    Once/Week    Once/Month

How long have you been doing this?

1 month    2 months    3 months    4 months    5-11 months    More than 1 year



- b). Do you take laxatives to prevent weight gain? YES NO**  
**How often do you do this?**  
 Daily Twice/Week Once/Week Once/Month  
**How long have you been doing this?**  
 1 month 2 months 3 months 4 months 5-11 months More than 1 year
- c). Do you take diuretics (water pills) to prevent weight gain? YES NO**  
**How often do you do this?**  
 Daily Twice/Week Once/Week Once/Month  
**How long have you been doing this?**  
 1 month 2 months 3 months 4 months 5-11 months More than 1 year
- d). Do you fast (skip food for 24 hours) to prevent weight gain? YES NO**  
**How often do you do this?**  
 Daily Twice/Week Once/Week Once/Month  
**How long have you been doing this?**  
 1 month 2 months 3 months 4 months 5-11 months More than 1 year
- e). Do you chew of food but spit it out to prevent weight gain? YES NO**  
**How often do you do this?**  
 Daily Twice/Week Once/Week Once/Month  
**How long have you been doing this?**  
 1 month 2 months 3 months 4 months 5-11 months More than 1 year
- f). Do you give yourself an enema to prevent weight gain? YES NO**  
**How often do you do this?**  
 Daily Twice/Week Once/Week Once/Month  
**How long have you been doing this?**  
 1 month 2 months 3 months 4 months 5-11 months More than 1 year
- g). Do you take appetite control pills to prevent weight gain? YES NO**  
**How often do you do this?**  
 Daily Twice/Week Once/Week Once/Month  
**How long have you been doing this?**  
 1 month 2 months 3 months 4 months 5-11 months More than 1 year
- h). Do you diet strictly to prevent weight gain? YES NO**  
**How often do you do this?**  
 Daily Twice/Week Once/Week Once/Month  
**How long have you been doing this?**  
 1 month 2 months 3 months 4 months 5-11 months More than 1 year



i). Do you exercise a lot? YES NO

How often do you do this?

Daily Twice/Week Once/Week Once/Month

How long have you been doing this?

1 month 2 months 3 months 4 months 5-11 months More than 1 year

5. If you answered YES to “exercise a lot,” please answer questions #5a, 5b, 5c & 5d.  
If you answered NO to “exercise a lot,” skip to question #6.

5a. Fill in the blanks below:

I \_\_\_\_\_ (types of exercise, e.g., jog, swim) for an average of \_\_\_\_\_ hours at a time.

5b. My exercise sometimes significantly interferes with important activities.

YES NO

5c. I exercise despite injury and/or medical complications.

YES NO

5d. Is your primary reason for exercising to counteract the effects of binges or to prevent weight gain?

YES NO

6. Does your weight and/or body shape influence how you feel about yourself?

|            |          |                   |           |                         |
|------------|----------|-------------------|-----------|-------------------------|
| 1          | 2        | 3                 | 4         | 5                       |
| Not at all | A little | A moderate amount | Very much | Extremely or Completely |

7. How afraid are you of becoming fat?

|            |          |                   |           |                         |
|------------|----------|-------------------|-----------|-------------------------|
| 1          | 2        | 3                 | 4         | 5                       |
| Not at all | A little | A moderate amount | Very much | Extremely or Completely |

8. How afraid are you of gaining weight?

|            |          |                   |           |                         |
|------------|----------|-------------------|-----------|-------------------------|
| 1          | 2        | 3                 | 4         | 5                       |
| Not at all | A little | A moderate amount | Very much | Extremely or Completely |

9. Do you consider yourself to be:

|               |                  |            |               |            |                      |
|---------------|------------------|------------|---------------|------------|----------------------|
| 1             | 2                | 3          | 4             | 5          | 6                    |
| Grossly Obese | Moderately Obese | Overweight | Normal Weight | Low Weight | Severely Underweight |



10. Certain parts of my body (e.g., abdomen, arms, buttocks, thighs) are too fat.

YES NO

11. I feel fat all over.

YES NO

12. I believe that how little I weigh is a serious problem.

YES NO

13. I have missed at least 3 consecutive menstrual cycles (not including those missed during a pregnancy).

YES NO





## APPENDIX I

### DEBQ-R

This scale measures eating behaviors. There are no right or wrong answers, so try very hard to be completely honest in your answers. Remember your responses are completely confidential. **Please circle the response that best represents you.**

1. When you have put on weight, do you eat less than you usually do?

|       |        |           |       |            |
|-------|--------|-----------|-------|------------|
| 1     | 2      | 3         | 4     | 5          |
| never | seldom | sometimes | often | very often |
2. Do you try to eat less at meal times than you would like to eat?

|       |        |           |       |            |
|-------|--------|-----------|-------|------------|
| 1     | 2      | 3         | 4     | 5          |
| never | seldom | sometimes | often | very often |
3. How often do you refuse food or drink offered because you are concerned about your weight?

|       |        |           |       |            |
|-------|--------|-----------|-------|------------|
| 1     | 2      | 3         | 4     | 5          |
| never | seldom | sometimes | often | very often |
4. Do you watch exactly what you eat?

|       |        |           |       |            |
|-------|--------|-----------|-------|------------|
| 1     | 2      | 3         | 4     | 5          |
| never | seldom | sometimes | often | very often |
5. Do you deliberately eat foods that are slimming?

|       |        |           |       |            |
|-------|--------|-----------|-------|------------|
| 1     | 2      | 3         | 4     | 5          |
| never | seldom | sometimes | often | very often |
6. When you have eaten too much, do you eat less than usual the following day?

|       |        |           |       |            |
|-------|--------|-----------|-------|------------|
| 1     | 2      | 3         | 4     | 5          |
| never | seldom | sometimes | often | very often |
7. Do you deliberately eat less in order not to become heavier?

|       |        |           |       |            |
|-------|--------|-----------|-------|------------|
| 1     | 2      | 3         | 4     | 5          |
| never | seldom | sometimes | often | very often |
8. How often do you try not to eat between meals because you are watching your weight?

|       |        |           |       |            |
|-------|--------|-----------|-------|------------|
| 1     | 2      | 3         | 4     | 5          |
| never | seldom | sometimes | often | very often |
9. How often in the evenings do you try not to eat because you are watching your weight?

|       |        |           |       |            |
|-------|--------|-----------|-------|------------|
| 1     | 2      | 3         | 4     | 5          |
| never | seldom | sometimes | often | very often |
10. Do you take your weight into account with what you eat?

|       |        |           |       |            |
|-------|--------|-----------|-------|------------|
| 1     | 2      | 3         | 4     | 5          |
| never | seldom | sometimes | often | very often |















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